
Vapor Intrusion Investigation Work Plan

South Dayton Dump and Landfill Site
Moraine, Ohio

As Modified by USEPA

Revision of the Conestoga-Rovers & Associates

August 9, 2011 Submittal



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US EPA RECORDS CENTER REGION 5



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Technical assistance provided by CH2M HILL

DISCLAIMER

This work plan is a modified version of the (unapproved) August 9, 2011 Vapor Intrusion Study Work Plan submitted to the USEPA by Conestoga-Rovers & Associates (CRA) on behalf of the Respondents to the Administrative Settlement Agreement and Order on Consent for the South Dayton Dump and Landfill Site.

CH2M HILL recommended modifications to the work plan to address comments provided to CRA and the Respondents by USEPA and Ohio EPA on March 17, May 11, and July 19, 2011. CH2M HILL also recommended modifications to address follow-up comments provided by USEPA and Ohio EPA during multiple teleconferences in September and October 2011. Upon acceptance of the recommended modifications by USEPA and Ohio EPA, CH2M HILL prepared this Work Plan. The revisions include modifications or additions to the sampling and data assessment procedures that are consistent with the October 2010 USEPA Region 5 Vapor Intrusion Guidebook (Guidebook) and input from the Ohio Department of Health.

- Historical analytical data were not added or modified.
- Historical analytical data were not validated, evaluated for data usability, assessed for appropriateness of collection methodology, or verified against their respective laboratory analytical reports.
- Screening levels presented in tables and figures were revised to be consistent with the Guidebook. Tables were added in order to compare the 2009 and 2010 soil vapor data to the correct screening levels.
- The revised Work Plan retains as much original figure content as possible. Changes in colors or line formatting are due to software compatibility issues. Minor formatting changes were made.
- Unrevised draft text was not edited.

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1 INTRODUCTION

This Vapor Intrusion Investigation Work Plan (Work Plan) presents the approach for a Vapor Intrusion Study (VI Study) to investigate sub-slab soil vapor conditions beneath buildings on and adjacent to the South Dayton Dump and Landfill Site consistent with the December 10, 2010, Dispute Resolution Agreement. The VI Study will be completed as an interim response action pursuant to Paragraph 37(c) of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (RI/FS) of the Site, Docket No. V-W-06-C-852 (ASAO). The VI Study is required under Paragraph 4 of the December 10, 2010, Dispute Resolution Agreement signed by the Respondents and United States Environmental Protection Agency (USEPA).

Conestoga-Rovers & Associates (CRA) prepared a draft of this Work Plan on behalf of the Respondents to the ASAO (Respondents) and submitted it to USEPA for approval on August 9, 2011. In September 2011, USEPA tasked its oversight contractor, CH2M HILL, to assist USEPA in addressing outstanding USEPA and Ohio EPA comments on CRA's August 9, 2011, Work Plan. The November 2011 Work Plan is the USEPA-modified CRA Work Plan, with assistance from CH2M HILL, completed under Work Assignment 130-RSBD-B52B, Statement of Work Revision 2.

The Respondents to the ASAO include Hobart Corporation (Hobart), Kelsey Hayes Company (Kelsey-Hayes), and NCR Corporation (NCR). These three Respondents (the PRP Group) are and have been performing the Work required by the ASAO under the direction and oversight of the USEPA.

USEPA will complete community outreach for the on-Site businesses and adjacent businesses and residents. Additional involvement by the Respondents may be required if the scope of the vapor intrusion study is expanded.

1.1 BACKGROUND INFORMATION

The Site is located at 1901 through 2153 Dryden Road and 2225 East River Road in Moraine, Ohio (Figure 3). The Site is bounded to the north and west by the Miami Conservancy District floodway (part of which is included in the definition of the Site), the Great Miami River Recreational Trail and the Great Miami River beyond. The Site is bounded to the east by Dryden Road with light industrial facilities beyond, to the southeast by residential and commercial properties along East River Road with a residential trailer park beyond, and to the south by undeveloped land with industrial facilities beyond.

The Site operated as a landfill from the early 1940s until 1996. Municipal, commercial, and industrial wastes were disposed at the landfill over the years. Combustible wastes often were burned. Site environmental assessments began in 1985 and are ongoing. Detailed information on the Site history and environmental assessment is contained in the *Streamlined Remedial Investigation and Feasibility Study for Operable Unit One* (OU1 RI/FS, CRA, June 2011), which is under review by USEPA.

In accordance with USEPA's (2005) *Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities*, landfill gas (LFG) is the natural byproduct of the anaerobic decomposition of biodegradable waste in landfills. It typically consists of 40 to 60 percent carbon dioxide, 45 to 60 percent methane, and trace constituents that include volatile organic compounds (VOCs) and hazardous air pollutants. More than 50 different VOCs (including simple alkanes, olefins, aromatics, and a wide array of chlorinated compounds) have been identified in LFG. In addition, non-organic species such as hydrogen sulfide and vapor-phase mercury often are found in LFG. LFG from co-disposal facilities typically includes higher VOC concentrations compared to a municipal solid waste landfill that has not received any significant quantity of toxic or hazardous waste.

Subsurface lateral migration of LFG must be considered during environmental assessments. Lateral migration may be especially problematic when surface soil is frozen or surrounding areas are paved. These situations result in a higher subsurface pressure gradient and, thus, longer transport distances.

As discussed in USEPA (2005), VI of LFG into nearby existing or reasonably anticipated future buildings is a potential exposure pathway that needs to be assessed. VI is the migration of volatile chemicals from the subsurface into overlying buildings. VI is a potential concern at any building, existing or planned, located near soil, groundwater, or soil vapor contaminated with toxic chemicals that may volatilize or chemicals that are combustible. Figure 1 presents a conceptual site model (CSM) illustrating VI.

Methane is a flammable, potentially explosive gas that is combustible under specific conditions (i.e., the right combination of methane and oxygen plus a source of ignition). Methane is explosive at concentrations that range from the lower explosive limit (LEL) of 5 percent to the upper explosive limit (UEL) of 15 percent methane per volume of air. This corresponds to methane concentrations of 50,000 to 150,000 parts per million by volume (ppmv). A percentage of the LEL (e.g., 10 percent [5,000 ppmv]) is commonly used as a trigger/action level to provide some margin of safety. However, the VI pathway cannot be dismissed if vapor concentrations are below the LEL (or action level) for methane because vapor concentrations of other VOCs or toxic LFG constituents may still be unacceptable (USEPA 2005).

During the streamlined RI for Operable Unit 1, elevated concentrations of VOCs (including naphthalene) in groundwater and landfill materials were observed at the Site. These observations, along with the presence of on-Site and nearby buildings and concerns about potential methane generation and migration, triggered concerns about soil vapor.

In September 2009, soil vapor samples were collected from 21 permanently installed soil vapor probes at the Site and on an adjacent property, and one of the soil vapor probes was re-sampled in January 2010 (GP20-09 on Parcel 5171). The samples were analyzed for VOCs by USEPA Method TO-15. The soil vapor sample results were screened with generic soil vapor screening levels (SVSLs) that were derived by applying the USEPA Region 5 Vapor Intrusion Guidance (USEPA 2010) default soil-gas-to-indoor-air attenuation factor of 0.1 to the USEPA (2011) indoor air regional screening levels (RSLs). The RSLs are derived assuming a 10^{-6} target ELCR level or a HI of 1. Evaluation surrogates were used for constituents without RSLs. Industrial SVSLs were used for commercial and industrial buildings; residential SVSLs were used for residential buildings.

Table 2 presents the September 2009 and January 2010 soil vapor sample results compared to the industrial SVSLs. Table 3 presents the September 2009 soil vapor sample results from the soil vapor probes that are located in the vicinity of residential buildings (GP06-09, GP07-09, GP08-09, and GP09-09) compared to the residential SVSLs. Figure 3 presents the soil vapor results that were greater than the SVSLs. The VOCs detected in soil vapor samples in exceedance of the SVSLs were 1,1-dichloroethane (DCA); benzene; chlorobenzene; chloroform; cis-1,2-dichloroethane; ethylbenzene; naphthalene; tetrachloroethene; trichloroethene; vinyl chloride, and total xylenes. Exceedances of the SVSLs occurred at 16 of the 21 soil vapor probes.

Field screening for methane was performed at the soil vapor probes in September, October, and December 2009 (Figure 3). The soil vapor methane concentrations were compared to the UEL (15 percent methane) and LEL (5 percent methane) for methane (Table 4). Methane concentrations exceeded 10 percent of the LEL (0.5 percent methane) at 10 of the 21 soil vapor probe locations, the LEL at 5 of those 10 locations, and the UEL at 3 of those 5 locations.

1.2 DISPUTE RESOLUTION AGREEMENT

There are a number of buildings located on the Site and adjacent properties, above or immediately adjacent to fill material and in close proximity to the soil gas probe locations where elevated concentrations of VOCs and methane were detected. By a letter dated October 5, 2010, USEPA had directed Respondents to submit a work plan for a VI Study to address the potential for current risks from VI to residents and businesses in buildings on and adjacent to the Site.

Under the December 10, 2010 Dispute Resolution Agreement the Respondents and USEPA agreed that the Respondents will complete the VI Study to assess the potential for methane, VOCs, and naphthalene in soil vapor to result in potential risks to receptors in buildings on and adjacent to the Site.

Specifically, Paragraph 4 of the Dispute Resolution Agreement states:

[T]he Respondents shall conduct the VI Study, as required by EPA, pursuant to Paragraph 37(c) of the ASAOC, as an interim response action. EPA has given the Group a copy of the newly issued EPA Region 5 Vapor Intrusion Guidebook (Guidebook) and the Parties have agreed that the Respondents will prepare their VI Work Plan, which will include Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) Addenda, in accordance with this new guidance and other relevant guidance (e.g., FSP and QAPP guidance). The Parties agree that the Work Plan will provide for sub-slab sampling, on an expedited schedule of any of the following structures which are of slab-on-grade construction or have basements or enclosed crawl spaces (see highlighted structures on Figure [1], attached, for an illustration of the structures for which sub-slab sampling is anticipated):

A. Structures On Site West of Dryden Road:

3 building structures on Lot 5054

3 building structures on Lot 5171

2 building structures on Lot 5172

1 building structure on Lot 5174

1 building structure on Lot 5175, and

B. Structures On Site or Adjacent to Site Along East River Road:

4 building structures on Lot 4610 (Barnett; on-Site)

2 building structures on Lot 3207

1 residence on Lot 3253; and

1 building structure on Lot 3254.

Any additional structures on the Site that are, or may be, occupied will be evaluated to determine the need for VI sampling.

The Parties agree that if any structure on or adjacent to the Site that is or may be occupied has no slab (e.g., dirt or gravel floor) that Respondents will take indoor air samples (see Section 6.6 of Guidebook).

The Parties agree that the Respondents shall submit a Work Plan for the VI Study required by EPA by December 17, 2010. The Parties agree that if identified contaminant concentrations pose more than a 1×10^{-4} cancer risk or a hazard index greater than 1.0 through the VI pathway to

current or potential future receptors, or if VI sampling results show an exceedance of 10% of the Lower Explosive Limit [for methane], EPA may require actions to mitigate those risks.

The PRP Group prepared initial drafts of this Work Plan based on requirements of the Dispute Resolution Agreement, previous investigation results, discussions between the PRP Group and USEPA, and the results of the survey of buildings at the parcels identified in the Dispute Resolution Agreement. The building surveys were completed by representatives of CH2M HILL (USEPA's oversight contractor), Ohio Environmental Protection Agency (Ohio EPA), the Respondents, and CRA (refer to Section 2 for additional details).

In September, 2011, USEPA tasked its oversight contractor, CH2M HILL, to assist USEPA in addressing outstanding USEPA and Ohio EPA comments on CRA's draft August 9, 2011, Work Plan. This final, approved Work Plan is the USEPA-modified CRA Work Plan, with assistance from CH2M HILL.

1.3 PURPOSE AND SCOPE

The purpose of the VI Study is to collect additional data to determine if compounds are currently present in soil vapor beneath on-Site and nearby building foundations and floor slabs at concentrations sufficient to create the potential for contaminants to migrate into the indoor air of the VI Study buildings at levels posing an unacceptable risk to building occupants. If sub-slab soil vapor (or crawl space air) VOC concentrations exceed the SVSLs (or CSSLs) for further investigation (See Section 5 and Tables 5 and 6), then follow-up indoor air sampling with concurrent sub-slab soil vapor (or crawl space air) and outdoor air sampling will be performed to determine if the VI pathway is causing indoor air VOC concentrations to exceed the IASLs for mitigation (See Section 5 and Table 7). Alternately, indoor air sampling (with outdoor air sampling) may be conducted concurrently with the Round 1 sub-slab soil vapor (or crawl space air) sampling at any or all of the VI Study buildings to minimize the number of field mobilizations and number of subslab samples that may ultimately be required.

Ongoing monitoring may be required during and after the Remedial Design / Remedial Action (RD/RA) to ensure that risks to receptors associated with soil vapor migration to indoor air do not exceed target levels in the future. Additionally, permanent explosive gas alarms will be installed in all occupied structures located within 200 ft of the horizontal limits of waste placement as required by Ohio Administrative Code (OAC) 3745-27-12. The ongoing monitoring for the RD/RA and installation of permanent explosive gas alarms are not covered by this work plan.

The VI Study consists of the following to assess the potential VI risk to relevant receptors:

- A building survey to identify the buildings present on the parcels listed in Section 1 and to develop a CSM for each of the buildings¹. The CSMs were used to determine the number and types of samples required to characterize the potential VI risk to relevant receptors.
- Sub-slab soil vapor probes installed and sampled at each of the VI Study buildings that have slabs. The sub-slab samples will be field screened for methane and carbon dioxide (the main components of LFG) at each of the buildings. Sub-slab soil vapor samples also will be analyzed for VOCs at buildings designed for occupancy (i.e., residences and buildings associated with commercial or industrial businesses where workers would be expected to access the building frequently and for extended periods). Sub-slab soil vapor samples at buildings that are currently vacant or unused but with the potential to become occupied in the future will be analyzed for VOCs.
- Indoor air methane and carbon dioxide concentrations will be measured at each of the VI Study buildings using field instruments.
- Crawl space air samples will be collected instead of sub-slab soil vapor samples at the two buildings with crawl spaces (Building A on Parcel 4610 and Building MP on Parcel 5054). The crawl space air samples will be field screened for methane and carbon dioxide and analyzed for VOCs. Concurrent outdoor air samples will be collected at each parcel near these buildings to assess ambient VOC contributions at the Site to the crawlspace air samples.
- Concurrent sub-slab soil vapor, indoor, and outdoor air samples will be collected at Building 1 on Parcel 3253 because this building has a basement with foundation walls that are in poor condition (i.e., where VI could occur through the walls). An outdoor air sample also will be collected at this parcel with the indoor air samples to assess ambient VOC concentrations adjacent to the building.
- One outdoor air sample will be collected for VOC analysis each day that sub-slab soil vapor samples are collected for VOC analysis. The outdoor air samples collected at the parcels where indoor or crawl space air sampling is being performed will serve as the daily outdoor air sample. To ensure local-scale outdoor air concentrations are characterized at and adjacent to the building, multiple outdoor air samples will be collected if parcels more than 1,000 feet apart are sampled in a single day. Outdoor air methane and carbon dioxide

¹ The building surveys were completed between June 21 and 22, 2011, by representatives of CH2M HILL, Ohio EPA, the Respondents, and CRA.

concentrations will be measured each day at each of the VI Study parcels being sampled.

- Concurrent sub-slab soil vapor, indoor, and outdoor air samples will be collected during a follow-up sampling event at each of the VI Study buildings where the measured Round 1 sub-slab soil vapor (or crawl space air) VOC concentrations exceed the SVSLs (or CSSLs) for further investigation (See Section 5 and Tables 5 and 6). Alternately, indoor air sampling (with outdoor air sampling) may be conducted concurrently with the Round 1 sub-slab soil vapor (or crawl space air) sampling at any or all of the VI Study buildings to minimize the number of field mobilizations and number of subslab samples that may ultimately be required.
- Conduct multiple rounds of VI sampling at each of the VI study building unless mitigation is performed after the Round 1 sampling event. The Round 1 sampling event will be performed in the winter. If follow-up sampling is triggered by the Round 1 results, then the sampling event will also be performed in the winter. The Round 2 sampling event (i.e., resampling of all the Round 1 and Round 1 follow-up sampling locations) will be performed in the mid-summer. If follow-up sampling is triggered by the Round 2 results, then the sampling event will also be performed in the summer.
- Analytical results will be compared with the applicable residential or industrial screening levels (Tables 2 through 6) in accordance with the data evaluation procedures described in Section 5 and the flow chart provided on Figure 2. Additional non-analytical lines of evidence (e.g., building characteristics) also will be considered during the data evaluation.
- If it is determined that mitigation or monitoring is required at any of the VI Study buildings, then separate work plans will be submitted to USEPA for approval as discussed in Section 5.

1.4 VAPOR INTRUSION GUIDANCE

The VI Study will be performed in accordance with the following vapor intrusion guidance documents:

- Office of Solid Waste and Emergency Response (OSWER) - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002 (USEPA, 2002)
- Interstate Technology Regulatory Council (ITRC) - Vapor Intrusion Pathway: A Practical Guide, January 2007 (ITRC, 2007)

- United States Environmental Protection Agency (USEPA) - Region 5 - Vapor Intrusion Guidebook, October 2010 (USEPA, 2010)
- Ohio Environmental Protection Agency (Ohio EPA) - Sample Collection and Evaluation of Vapor Intrusion to Indoor Air Guidance Document, May 2010 (Ohio EPA, 2010).

1.5 WORK PLAN ORGANIZATION

The remainder of this Work Plan is presented in the following titled sections:

- Section 2, Conceptual Site Models for VI Study Buildings
- Section 3, Data Quality Objectives
- Section 4, Proposed Sampling Activities
- Section 5, Data Evaluation and Reporting
- Section 6, Schedule
- Section 7, References

2 CONCEPTUAL SITE MODELS FOR VI STUDY BUILDINGS

On June 21 and 22, 2011, representatives of CH2M Hill, Ohio EPA, the Respondents, and CRA completed building surveys at the parcels identified in the Dispute Resolution Agreement (see Section 1.1), which included a visual inspection of the parcels and the buildings located thereon. Twenty-seven buildings were identified on the parcels. The one building on Parcel 5176 was excluded from the VI Study because it is a trailer that is not skirted (i.e., outdoor air flows freely beneath the building); therefore, a potential for VI does not exist. A building survey was not performed at this building. There were two buildings that were not accessible during the building surveys; Building 7 on Parcel 5054, and Building 3 on Parcel 5172. Additionally, half of Building 1 on Parcel 5172 was not accessible; however, a portion of the building was visible through the front windows. A twenty-eighth building was identified on Parcel 5171 (Building 4) during a site visit in September 2011. Building surveys for these three and one-half buildings will be completed during the first 3 days of the Round 1 sampling event and will be coordinated with USEPA's onsite representative. The sampling locations at these buildings will be selected during the building survey in conjunction with USEPA's onsite representative and will be approved by USEPA (figures showing the sampling locations will be submitted via e-mail to USEPA within 3 days of the building survey). The sampling will then be performed at these buildings during the Round 1 sampling event after USEPA approval of the sampling locations is confirmed. The CSMs for these buildings will be included with the data evaluation submitted after the initial Round 1 sampling event.

The building surveys were completed in order to gather the information necessary to develop VI-specific CSMs for each VI Study building; the CSMs then were used to develop the VI Study sampling plans for each of the VI Study buildings (see Section 4). CRA documented the number and type of buildings present on each Parcel in order to ensure that all buildings are included in the sampling program. At 25 of the 28 VI Study buildings, CRA documented information pertinent to the development of VI-specific CSMs on a Building Physical Survey Questionnaire (e.g., the purpose of each building, hours of occupation, type of building foundation, and nature of the ground surface surrounding the buildings). Ohio EPA and CH2M Hill provided additional details based on their observations. The original Building Physical Survey Questionnaires, including comments from Ohio EPA and CH2M Hill, and associated building photographs, are provided in Appendix A (provided electronically). The VI Study building locations are shown on Figure 4.

CRA used the information obtained during the building surveys to develop VI-specific CSMs for each VI Study building. The CSMs present information about the buildings that is pertinent to the VI pathway such as use and design, floor slab condition, and VOC, naphthalene and

methane concentrations measured at nearby investigative installations. Figure 5 presents soil, groundwater, and soil gas investigative locations in the vicinity of the VI Study buildings. The CSMs are summarized in Table 1 and on Figures 6 through 31. The respective figures for each building show the maximum detected concentration of selected compounds in nearby soil gas, landfill material, and groundwater locations sampled between 2008 and 2011. As discussed during the July 26, 2011, conference call between the Respondents, USEPA, Ohio EPA, and CH2M Hill, the selected compounds include 1,1,1-trichloroethane, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, benzene, chlorobenzene, chloroform, ethylbenzene, methylene chloride, naphthalene, tetrachloroethene (PCE), trichloroethene (TCE), toluene, vinyl chloride, and xylenes. A description of each building is provided below.

2.1 PARCEL 3207 - GLOBE EQUIPMENT

2.1.1 PARCEL 3207 - GLOBE EQUIPMENT BUILDING 1

The building is a single-story, commercial/industrial-use building comprised primarily of office space with some assembly/warehouse space (Figure 6). The building was constructed in 2004 over the historic location of former gasoline retail station and automobile salvage yard. The building footprint is 9,954 square feet (ft²). The building has a concrete on-grade slab; unsealed joints can be seen in assembly/warehouse space. The office space has wall-to-wall carpeting. The building is insulated and relatively air tight with sealed, inoperable windows. The building is heated by forced air natural gas units located on the roof. Central air conditioning (A/C) is also provided by rooftop units. Exterior openings include vents, utility pipe penetrations, man doors, and a roll-up door in the warehouse. The building is occupied weekdays from 8 a.m. to 5 p.m. by approximately 15 adult workers.

2.1.2 PARCEL 3207 - GLOBE EQUIPMENT BUILDING 2

The building is a single-story industrial-use building comprised primarily of warehouse/assembly space with some office space (Figure 7). Before 1968, the main portion of the building was constructed of concrete block. The northern addition was constructed before 1973 of steel frame and aluminum siding. The building footprint is 19,803 ft², and the ceilings are 16 feet high with 8-foot drop ceilings in the office space. The building has a concrete on-grade slab with unsealed joints. The majority of the building has bare concrete floors, except the office space is carpeted. Some large floor cracks are visible, with some cracks sealed. The building is not insulated, and is relatively air tight with unsealed windows and bay doors that are open in good weather. The building is centrally heated by forced air natural gas furnace. Central A/C is also provided by rooftop units. Exterior openings include vents, fans, utility pipe penetrations,

windows, bay doors, and personnel doors. The building is occupied weekdays from 7:00 a.m. to 5:00 p.m. by approximately 25 adult workers.

2.2 PARCEL 3253

2.2.1 PARCEL 3253 - HOUSE, BUILDING 1

The building is a two-story, residential, single-family house constructed in the 1800s (Figure 8). The building has a stone foundation and vinyl siding. The basement of the house is 926 ft² and is damp and unfinished, with a concrete floor that contains an approximately 2-foot-diameter hole. The effluent of a condensate pipe is located over the large hole in the basement concrete floor. The building is constructed of stone and mortar foundation walls (unsealed), which are in poor condition. The building is relatively air tight with sealed windows. The building is centrally heated by a forced air natural gas furnace, and fireplace, and cooled by central A/C. Exterior openings include utility pipe penetrations, two windows, and two man doors (one exterior and one to the house). The building is constantly occupied by one adult resident. The basement does not appear to be used for storage and CRA did not observe any potential background sources of indoor air contaminants within the basement.

2.2.2 PARCEL 3253 - GARAGE, BUILDING 2

The building is a single-story, two-car garage constructed in the early 1990s (Figure 9). The building footprint is 1,128 ft². The building has a concrete on-grade slab with 4-inch high, poured concrete foundation walls (unsealed), and vinyl -siding. The concrete slab is composed of six separate poured sections with unsealed joints. The building is relatively air tight with sealed windows. No heating, ventilation, and air conditioning (HVAC) systems are present in the building. Exterior openings include two windows, overhead and personnel doors. The building is used for storage only and has no regular occupancy.

2.3 PARCEL 3254 - MIDDLETON TRUCKING BUILDING 1

The building is a single-story, commercial-use building comprised primarily of a heavy truck repair garage with a small office and a bathroom (Figure 10). The building was constructed before 1968. The building footprint is 2,000 ft², and the ceiling (an exposed sheet metal roof) is 12 feet high. The concrete block walls are unsealed and cracked in areas. The building has a concrete on-grade slab. The majority of the concrete shop floor contains large cracks and is heavily stained. CRA observed the heaviest staining at the rear of the building, adjacent to aboveground storage tank (AST) and compressor. The building is not insulated, with no air tightness, and unsealed windows. Overhead natural gas heaters and a wood stove with an exterior air vent located through the west wall heat the building. Exterior openings include

vents, fans, utility pipe penetrations, six windows, a man door, and a large overhead door. The overhead door is open during business hours. The building is occupied weekdays from 8:00 a.m. to 5:00 p.m. by three to four adult workers. The parts washer in the building may have used chlorinated solvents historically but now only uses mineral spirits.

2.4 PARCEL 4610

2.4.1 PARCEL 4610 - ARA TRUCKING BUILDING 1

The building is a single-story, commercial-use trailer constructed early 1990s (Figure 11). It is designed as a residential trailer; there are two bedrooms, a bathroom, a kitchen, and a living room. The living room is being used as an office; the two bedrooms are unused. The trailer is 685 ft² placed over a concrete pad with a crawl space enclosed by wood skirting (poor condition). The concrete and wood appear damp. The trailer is insulated and relatively air tight, with sealed windows. The building is centrally heated by a forced air propane furnace. Central A/C is also provided. Exterior openings include vents, utility pipe penetrations, windows, doors. The building has variable occupancy that consists of several hours every few weeks by two adult workers.

2.4.2 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING B

The building is a single-story, commercial-use storage building constructed before 1993 (Figure 12). The building is primarily warehouse space (one large open space with no partitions) that is used for storing estate sale items with a modular office that currently is not in use. There is an attached open garage with a dirt floor. The building footprint is 1,800 ft² (without the garage). It is a wood frame building with steel beams covered with steel cladding. The ceiling is 20 feet high. The building has a concreted on-grade slab with concrete block foundation walls (poor condition). The building floor is exposed concrete and contains large cracks. The building is not air tight. No central HVAC systems are present in the building. A window A/C unit is located in the modular office that draws air from the warehouse. Exterior openings include a large sliding door, and a personnel door. The building is occasionally occupied two to three times per month, by an adult worker picking up or dropping off storage items.

2.4.3 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING C

The building is a single-story commercial-use storage building, constructed in the early 1990s (Figure 13). The building is primarily warehouse space (one large open space with no partitions) that is used for storage; a van, a trailer, and other miscellaneous items were observed during the building survey. There is a former bathroom in the northwestern corner that is no

longer in use; the plumbing was shut off. There is an attached open lean-to with a dirt floor. The building footprint is 1,088 ft². The ceiling is 16 feet high. The concreted slab is on-grade with unsealed joints; there is no floor covering. Floor cracks are present. It is a wood frame building covered with steel cladding. The building is insulated and is not air tight. Floor cracks are present. No HVAC systems are present in the building. Exterior openings include a sliding door and a personnel door. The building is used for storage only and has no regular occupancy.

2.4.4 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING D

The building is a single-story commercial-use storage building, with construction completed in the early 1990s (Figure 14). The building is entirely warehouse space with a plywood partition that is open at the top. The building is used for storage; a car, a lawn tractor, and other miscellaneous items were observed during the building survey. There is an attached open garage with a dirt floor. The building footprint is 1,200 ft². The building has a concrete on-grade slab with sealed joints; there is no floor covering. Floor cracks are present. It is a wood frame building covered with steel cladding. The building is not airtight. No HVAC systems are present in the building. Exterior openings include two sliding bay doors and personnel doors. The building is used for storage only and has no regular occupancy.

2.4.5 PARCEL 4610 - RON BARNETT CONSTRUCTION BUILDING E

The building is a single-story commercial-use building constructed by the early 1990s (Figure 15). The building is divided into three sections; the majority of the building is a car repair garage, there is a small storage area, and there is an office space with a bathroom. The building footprint is 1,200 ft². The ceiling is 20 feet high in the garage and storage area. The ceiling in the office is 8 feet high; the area above the office is used for storage (accessible from the storage area). The building has a 4-inch-thick concrete on-grade slab with unsealed joints; there is no floor covering. Significant floor cracks are present in the office and adjacent storage area. It is a wood and steel frame building covered with steel cladding. The building is not air tight, with a sealed window in the office and no weather seals in the storage area.

The office portion of the building is heated by electric baseboards and cooled by a window A/C unit. A wood stove is in the center of the building, which vents through the roof. Exterior openings include utility pipe penetrations, windows, sliding bay, overhead garage doors, and a personnel door. The overhead door is open when the garage is in use. The garage is occupied during variable hours (mostly occasional evenings and weekends) by two adult workers. The office may be occupied during normal working hours by one adult worker.

2.5 PARCEL 5054 - VALLEY ASPHALT

2.5.1 PARCEL 5054 - VALLEY ASPHALT BUILDING 1

The building is a single-story, commercial-use building, constructed before 1993 (Figure 16). The building footprint is 1,500 ft². It is an office building with six single offices, bathrooms, and a kitchenette. The drop ceiling is 8 feet high. It is a brick building with steel cladding. The building has a concrete on-grade slab; there is wall-to-wall carpeting in the majority of the building. The building is relatively air tight, with sealed windows that are inoperable. The building is centrally heated by a forced air natural gas furnace. Exterior openings include vents, utility pipe penetrations, windows (inoperable), and two personnel doors. The building has not been occupied for the past four or five years.

2.5.2 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 2

The building is a commercial/industrial-use building constructed before 1959 (Figure 17). The building footprint is 4,888 ft². The concrete slab is on-grade with unsealed joints. The building is divided into two sections with a cracked cinder block wall between them. The building has not been occupied for more than 10 years. The northern side (approximately one quarter) of the building is a brick, single-story building. It was used formerly as office space with several separate offices. The office area is carpeted and has a strong moldy/musty odor. This section of the building is relatively air tight, with sealed windows. This portion of the building is centrally heated by a forced air natural gas furnace and is cooled by a ground unit A/C that is located outside the east wall. Exterior opening include utility pipe penetrations, windows, and two personnel doors (one to a Quonset hut).

The southern side (approximately three-quarters) of the building is a steel double-arch Quonset hut that is used as storage space. It has a bare concrete floor with cracks in areas. This section of the building is unsealed and is not airtight. There is no HVAC system in this section of the building. Exterior openings include vents, wall openings, fans, utility pipe penetrations, windows (several of which were broken during the June 2011 building survey but found to be repaired during a September 2011 site visit), and bay and personnel doors.

2.5.3 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 3

The building is a single-story industrial-use building formerly used as a garage (Figure 18). The building footprint is 457 ft². It is a concrete block building with a gravel and earthen on-grade floor. The building is not insulated. The building is not air tight; a personnel door and overhead door panels are missing. A wood stove is present in the building but is no longer used. No other

HVAC systems are present in the building. Exterior openings include vents, wall openings, utility pipe penetrations, and windows. The building is vacant and has no regular occupancy.

2.5.4 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 4

The building is an industrial-use building, constructed prior to 1993 (Figure 19). It is a pre-fabricated split-level building on top of a poured concrete basement that is half below grade. The building footprint is 280 ft². The basement is unfinished, and contains paint storage on shelves. The main level is used as the control tower for the asphalt plant; there is office space and a bathroom. Electric baseboards heat the building. Window A/C units are also present in the control room. Exterior openings from the basement include utility pipe penetrations and a personnel door that sometimes left open. The building is occupied weekdays during business hours by two adult workers.

2.5.5 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 5

The building is a single-story, industrial-use building with steel cladding (Figure 20). The building was constructed before 1968 and originally was located near Valley Asphalt Building 1; it was moved to its present location before 1993. The building footprint is 594 ft². The building contains a testing laboratory and a small office. The ceiling is 8 feet high. The building has a concrete on-grade slab. The concrete flooring is coated or painted and contains some thin cracks. The building is relatively airtight with sealed windows. Exterior openings include vents, fans, windows (inoperable), and a personnel door. A forced air natural gas furnace centrally heats the building. Window A/C units are also present in the laboratory and office. One adult worker (office) occupies the building during weekday work hours, and approximately four adult workers rarely occupy the laboratory at various times.

2.5.6 PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 6

The building is a single-story, industrial-use storage building constructed before 2005 (Figure 21). The building footprint is 218 ft². It has a steel frame with steel cladding and an earthen on-grade floor. The building is not insulated, and is not air tight. No HVAC systems are present in the building. Exterior openings include vents and one personnel door. The building is used for chemical storage. The building is used for storage only and has no regular occupancy.

2.5.7 PARCEL 5054, BUILDING 7

The building is a single-story industrial-use garage and storage building constructed before 1968 (Figure 22). The building footprint is 822 ft². It is constructed of concrete block. The

building owner is unknown, and CRA was not able to inspect the building interior at time of building surveys. The building is heated by a forced air natural gas wall mounted heater. Exterior openings include vents, utility pipe penetrations, and an apparently inoperable bay door with broken panels. The building appears to be used for storage only, and does not appear to have been occupied for an extended period of time.

2.5.8 PARCEL 5054, MURPHY'S PLUMBING BUILDING MP

The building is a single-story commercial-use building, constructed prior to the 1950s (Figure 23). During the building survey, the building was being used as office and storage space. The building footprint is 365 ft². It is on a raised foundation with wood siding. The building is not air tight, with unsealed windows. Exterior openings include windows and one personnel door. No HVAC systems are present in the building. The building is vacant as of July 1, 2011, with no occupancy.

2.6 PARCEL 5171 - B&G TRUCKING

2.6.1 PARCEL 5171 - B&G TRUCKING BUILDING 1

The building is a commercial-use building constructed prior to 1968 (Figure 24). The building footprint is 13,700 ft². The building has a concrete on-grade slab with unsealed joints. Seven adult workers occupy the building weekdays from 7 a.m. to 5 p.m. The building is divided into two sections. The eastern side (approximately one quarter) is a brick two-story building. There are multiple offices, a reception area, and a paint storage room (northeastern corner). During the building survey, strong paint odors were observed in the paint storage room. There is wall-to-wall carpet in the offices. This section of the building is relatively airtight with sealed windows. A forced air natural gas furnace heats this section of the building, and there is central A/C. Exterior openings include utility pipe penetrations, windows, and three personnel doors (one to the shop area).

The western side (approximately three-fourths) is a one-story concrete block building. It is a repair shop for large trucks, with a shop office on the eastern side and a paint booth on the western side. The ceiling is 24 feet high; the shop office has an 8-foot drop ceiling. The shop floor is bare concrete, and there are visible cracks in areas. A floor drain leads to the sewer. There is evidence of spills on the truck bay area floor. The shop office has a tile floor. This section of the building is not insulated and not airtight. There is an overhead radiant heating system and used oil stove in the shop. During the building survey, strong paint odors were observed in the paint booth. Exterior openings include vents, fans, utility pipe penetrations, 10

bay doors large metal roll-up doors, and personnel doors. The bay doors are kept open during work hours.

2.6.2 PARCEL 5171 - B&G TRUCKING BUILDING 2

The building is a single-story commercial-use building, constructed prior to 1968 (Figure 25). The building footprint is 5,000 ft². The building is used for large truck repair with an office and break room area on the southern side. The concrete slab is on-grade with unsealed joints; there is one large floor drain, and there are visible cracks and staining in areas. The building is 20 feet high. There is a second story within the building over the office and break room area; the ceilings are 8 feet high. The shop area ceiling is 20 feet high. A forced air natural gas furnace in the office area centrally heats the building. An overhead radiant heating system and floor fans are present in the shop area. The building is not insulated and is not air tight. Exterior openings include vents, utility pipe penetrations, windows, personnel doors, and one large roll-up door. The roll-up door is kept open during work hours. The building is occupied weekdays from 7 a.m. to 5 p.m. by two adult workers.

2.6.3 PARCEL 5171 - B&G TRUCKING BUILDING 3

The building is a single-story commercial-use structure, erected prior to 2000 (Figure 26). The building footprint is 1,250 ft². The building is composed of canvas steel frame, covered with fabric and placed on asphalt, with retractable canvas flaps at both ends, and is used for sandblasting. The structure floor is cracked and damp. No HVAC systems are present in the structure. The building is occupied as needed weekdays from 7 a.m. to 5 p.m.

2.6.4 PARCEL 5171, BUILDING 4

This building was not identified during the June 2011 building survey; it was identified during a site visit on September 20, 2011. The building footprint is 495 ft². It appears to have been vacant for multiple years. It is surrounded by dense vegetation.

2.7 PARCEL 5172

2.7.1 PARCEL 5172 - S&J PRECISION AND OVERSTREET PAINTING BUILDING 1

The building is a single-story, industrial-use building, constructed in the 1950s (Figure 27). The building is divided into two equal sections: north and south sides. The total building footprint is 11,600 ft². The building is concrete block with brick front. The building has a concrete on-grade

slab. The ceilings are 16 feet high. Exterior openings include utility pipe penetrations, windows, and personnel and bay doors.

S&J Precision uses the north side of the building. It is mainly comprised of a metal working shop with a warehouse and some office space. The shop and warehouse have bare concrete floors; there are visible cracks in areas. The building floor contains two floor drains. The rear drain and warehouse floor are stained. The office space on the north side has an elevated floor with floor tile (likely asbestos containing) and wall-to-wall carpeting on top. The building is not insulated, relatively air tight, with sealed windows. The building is centrally heated by a forced air natural gas furnace. Central A/C is also present. The building is occupied weekdays from 6 a.m. to 5 p.m. by five adult workers.

Overstreet Painting uses the south side of the building. This section of the building could not be accessed during the building survey. The building appeared vacant (looking through the window). There is a bare concrete floor. There is a south office area similar to the north office area on the S&J Precision side.

2.7.2 PARCEL 5172 - FORMER A-EVANS AIR FILTER SERVICE BUILDING 2

The building is a single-story, commercial-use building, constructed prior to 1959 (Figure 28). As of the building survey, the building recently had become vacant; A-Evans Filter Service used it formerly. The building footprint is 2,886 ft². The building has a concrete on-grade slab with sealed joints. The building is divided into two sections.

The northern section (approximately one-fifth) is a one-story brick building. It was used formerly as office space; there are two single offices. The building is 10 feet high with 8-foot drop ceilings. There is wall-to-wall carpeting. A forced air natural gas furnace centrally heats this section of the building; it is heated from floor vents, with return air through wall vents. Central A/C is also present. Exterior openings include utility pipe penetrations, office windows, and two personnel doors (one to the shop).

The southern section (approximately four-fifths) is a one-story concrete block building that is 15 feet high. There is a 6-foot-high metal shed attached to the south side; it could not be accessed during the building survey. This section of the building formerly was used for grease filter washing and filter storage. The bare concrete floor has an area of heavy staining in the former wash area on the north side. There are numerous small- to mid-sized floor cracks. It is not insulated and not airtight. An overhead gas heater heats the shop area. Exterior openings include vents, utility pipe penetrations, a bay door, and two personnel doors.

2.7.3 PARCEL 5172 - BUILDING 3

Building 3 was not accessible during the building survey. The building footprint is 721 ft².

2.8 PARCEL 5173 - SIM TRAINER BUILDING 1

The building is a single-story commercial-use building (Figure 29). It was constructed in three stages: the northern and central portions were constructed before 1956, the western addition was constructed before 1959, and the southern addition was constructed before 1968. The building is used as a shooting range. The southern section is office and classroom space. The central section is the shooting range. The northern section is primarily storage space with a combat training room. The western section is not used and is not accessible. The building footprint is 8,250 ft². The building has a concrete on-grade slab with unsealed joints.

The majority of the building has exposed concrete floors. At the time of the building survey, the combat training room floor had been freshly coated with epoxy paint. The floor in the shooting range had been painted. There are large floor cracks present in the center of shooting range and north storage area. In the northern portion of the building, heavy floor staining is visible, and an oil odor is noticeable. The building is heated by forced air natural gas ceiling units. An additional air handling unit operates during shooting range hours; air is vented from the range out to the roof and fresh air is supplied where customers stand to shoot. Central A/C is also present in the office and classroom areas, supplied by a separate furnace. Exterior openings include vents, fans, windows, and two roll-up doors. One adult worker (4-hour shifts) and customers occupy the building during business hours.

2.9 PARCEL 5174 - COMMAND ROOFING BUILDING 1

The building is a single-story, commercial-use storage building, constructed prior to 1968 (Figure 30). The building is used by Command Roofing for roofing material storage. There is a former office space on the eastern side that is not currently in use. The building footprint is 12,500 ft². The building has a concrete on-grade slab. Areas A to E are shown on Figure 30. Areas A (approximately 12 feet in height) and B (approximately 16 feet in height) are constructed with brick, and contain poorly sealed windows. Spray-on insulation, possibly containing -asbestos, is present in Area B. Areas C (approximately 24 feet in height) to E were constructed with steel beams and metal siding. No HVAC systems were in use as of June 2011. The building is not air tight, and is damp and moldy, with visible evidence of water staining in office Area A. The building floor slab is in poor condition, with cracks and unsealed joints throughout the building, and is particularly fractured in Areas D and E. Through Areas B and E, heavy floor staining is present. Exterior openings include office windows, personnel doors,

sliding and roll-up doors. Two adult workers infrequently occupy the building at variable times for short periods for material pickup.

2.10 PARCEL 5175 - FORMER ALLIANCE EQUIPMENT AND SUPPLY BUILDING 1

The building is a single-story, commercial-use building, constructed prior to 1949(Figure 31). Alliance Equipment and Supply used the building formerly, but the building was being vacated at the time of the building survey. The building footprint is 4,557 ft². The building has a concrete on-grade slab with unsealed joints. The building is constructed of concrete block. There is a former office area on the eastern side. The central section is retail and warehouse/storage space. The western section (rear storage shed) is an addition constructed of steel frame with plywood walls and steel cladding.

A crawl space may be present on the south side. There is a shallow concrete pit present in the southwest corner of warehouse. Large sealed floor cracks are present in the middle portion of the building. The office area has wall-to-wall carpeting that is in poor condition. CRA observed floor staining in the warehouse and rear storage shed. A gasoline UST was removed from the former Conway Fence facility in 1990 on this Parcel. The window seals are in poor condition. At the time of the building survey, the overhead doors were open. The building is centrally heated by a forced air natural gas furnace. Central A/C is also present in the retail and office areas. A window unit A/C is present in the northern portion of building. Exterior openings include vents, fans, utility pipe penetrations, windows, and overhead and personnel doors. At the time of the building survey, the tenant was about to vacate the premises.

3 DATA QUALITY OBJECTIVES

The Data Quality Objectives (DQOs) for the VI Study, sampling strategy, and methodologies are discussed in further detail below.

A simplified discussion of the DQO steps for the VI Study is presented below.

Step 1: State the Problem

VOCs (including naphthalene) and methane are present in landfill material, groundwater and/or soil gas in the vicinity of multiple buildings on or immediately adjacent to the Site. Soil vapor samples collected from soil gas probes adjacent to three on-Site buildings, and 50 ft from a fourth building, contained VOC concentrations that are greater than industrial risk-based screening levels corresponding to an Excess Lifetime Cancer Risk (ELCR) of 1×10^{-4} or Hazard Index (HI) of 1 in indoor air assuming a default attenuation factor of 0.1. Concentrations of explosive gases (reported as methane) exceeded the LEL for methane in several soil gas probes in close proximity to buildings on or immediately adjacent to the Site. As detailed in the Dispute Resolution Agreement.

There are a number of operating businesses located on the Site, above or immediately adjacent to fill material and in close proximity to the gas probe locations where elevated levels of VOC and methane were detected.

In addition, there is at least one residential building located in close proximity to soil gas probe GP09-09, where elevated concentrations of VOCs were detected.

Additional data are required to determine if VOCs (including naphthalene) and methane present in landfill material, groundwater, or soil gas in the vicinity of multiple buildings on or immediately adjacent to the Site currently have the potential to pose unacceptable VI health risks or explosion hazards. Additional data (i.e., concurrent indoor, outdoor, and sub-slab soil vapor [or crawl space air] sampling data) will be required to determine if the VI pathway is currently causing indoor air VOC concentrations in exceedance of the IASLs for mitigation (see Section 5 and Table 7) at buildings where VOCs are measured in sub-slab soil vapor (or crawl space air) at concentrations exceeding the SVSLs (or CSSLs) for further investigation (see Section 5 and Tables 5 and 6) during either the Round 1 or 2 sampling events.

Step 2: Identify the Goals of the Study

- Determine whether sub-slab soil vapor, crawl space air, and/or indoor air VOC concentrations at the VI Study buildings designed for occupancy are Site-related (and, for crawl space and indoor air, are due to VI), and causing an ELCR or HI

above regulatory targets using the screening levels presented in Tables 5 through 7, the flow chart presented on Figure 2, and Section 5.2.

- Determine whether concentrations of methane beneath or within each VI Study building are Site-related (and, for crawl space air and indoor air, are due to VI) and exceed screening levels based on the LEL for methane in indoor air, crawl space air or sub-slab soil gas. The methane screening levels are detailed in Section 5.4 and the flow chart presented on Figure 2.
- Identify buildings where additional VI investigation or mitigation actions may be necessary (see Sections 5.2 – 5.4, Tables 5 through 7, and the flow chart presented in Figure 2).
- Measure sub-slab soil vapor, crawl space air, and/or indoor air VOC and methane concentrations under assumed worse case conditions (i.e., winter and mid-summer) at locations where VOCs and methane are not detected or are detected below regulatory target levels for mitigation (see Section 4.0 and Section 5.4).

Step 3: Identify Information Inputs

Information inputs include:

- Existing groundwater, landfill material, and soil gas data
- Building characteristics and Building Survey information
- Sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air VOC and methane data that will be collected during two to four separate field events (i.e., the Round 1 sampling event with follow-up sampling if necessary in the winter, and the Round 2 sampling event with follow-up sampling if necessary in mid-summer) under this Work Plan following the decision rules presented in Section 5.4 and in Figure 2

Step 4: Identify the boundaries of the Study

The VI Study parcels were selected during the December 10, 2010, Dispute Resolution Agreement. The buildings located on these parcels are included in the VI Study; the buildings are detailed in Sections 1.2 and 2, in Table 1 and on Figure 4.

Step 5: Develop the Analytic Approach

Before sample collection, sub-slab soil vapor probes will be installed, purged, and leak checked at buildings with slabs.

As detailed in Section 1.3, sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air samples will be collected over 8 or 24 hours (for industrial/commercial and residential use buildings, respectively) in Summa canisters equipped with flow controllers at the VI Study buildings that are designed for occupancy. Sub-slab soil vapor samples will be collected from the sub-slab soil vapor probes, following purging in accordance with the FSP. The sampling procedures are detailed in Section 4. Sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air samples will be submitted for analyses of VOCs (including naphthalene) in accordance with the requirements of the QAPP (CRA 2008) and USEPA Toxic Organics (TO)-15 (TO-15) Method.

Sub-slab soil vapor, crawl space air, indoor air, and/or outdoor air also will be field screened for methane and carbon dioxide (the main components of LFG) at each of the VI Study buildings. The field measurement procedures are detailed in Section 4. A subset of the sub-slab soil vapor, crawl space air, and indoor air samples (equal to 20 percent or more of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946, in order to confirm field methane readings (Section 4.2.1.3).

Step 6: Specify Performance or Acceptance Criteria

The VI study decision rules are presented in Section 5.4.

Table 8 presents the TestAmerica routine and low-level reporting detection limits (RDLs) and method detection limits (MDLs) for routine and low-level TO-15 analysis. The routine RDLs and MDLs are less than, and therefore, meet the screening levels, with some exceptions. 1,1,2,2-Tetrachloroethane; 1,2,4-trichlorobenzene; bromodichloromethane, dibromochloromethane, and naphthalene routine RDLs are greater than the residential screening levels for sub-slab soil vapor and indoor air; however, the routine MDLs for these parameters meet the residential screening levels for sub-slab soil vapor and indoor air ($ECLR = 10^{-5}$, $HQ = 1$ in indoor air assuming a default attenuation factor of 0.1). The low-level RDLs meet the residential screening levels for these parameters. However, the low-level method only provides a limited analyte list. Therefore, the regular method will be used to analyze the VI Study samples and the low-level method will be used in addition to analyze residential sub-slab soil gas and indoor air samples for 1,1,2,2-tetrachloroethane, bromodichloromethane, dibromochloromethane, and naphthalene to ensure that the reporting limits are less than the screening levels. 1,2,4-Trichlorobenzene is not on the low-level method analyte list; therefore, it will be by the regular method. The routine and low-level RDLs and the routine MDL for 1,2-dibromoethane (ethylene dibromide) are greater than industrial and residential screening levels; however, 1,2-dibromoethane was not detected in any groundwater, soil, or soil gas sample collected from Site investigative locations

and is therefore unlikely to be a contaminant of concern for the VI Study. Therefore, 1,2-dibromoethane will be analyzed by the regular method.

If a different analytical laboratory is selected to perform the TO-15 analysis, then CRA will ensure that the RDLs are less than the applicable screening levels for all VOCs by using any combination of the regular, low-level, or select ion monitoring (SIM) mode for TO-15. Exceptions may occur, such as 1,2-dibromoethane discussed above, if the VOC is not known to be Site-related (i.e., detected in any groundwater, soil, or soil gas sample collected from Site investigative locations to date).

Step 7: Develop the Plan for Obtaining Data

See Section 4 below, for detailed procedures proposed in order to obtain the required data. Indoor air, crawl space air, and sub-slab soil vapor samples will be located to provide adequate coverage of the entire building, while being biased towards areas where greater concentrations of historic landfill material, groundwater or soil vapor methane and VOC (including naphthalene) concentrations were recorded.

4 PROPOSED SAMPLING ACTIVITIES

CRA used the CSMs to develop the VI Study sampling plans (i.e., number, type, and location of samples) for each building. In determining the number and type of samples, CRA considered the following information from the relevant guidance documents: Section 6.2.3 of USEPA (2010) and Section 4.7 of Ohio EPA (2010). CRA did not include lean-tos, carports, kennels (unless contained within a larger building), open-sided buildings, etc. in the sampling program.

Section 6.2.3 of USEPA, 2010 states that "at least one SS sample should be collected from each property, if possible" and the sampling point should be located in the lowest point of the property (i.e., the basement or, where no basement is present, the ground floor) and approximately in the middle of the room where concentrations are expected to be highest while potentially having the greatest radius of influence for sub-slab vapor across the footprint of the basement. While not mandating a specific number of samples per building, USEPA, 2010 does note that "[p]roperties where the collection of more than one SS sample is particularly desirable includes schools and multi-family homes, basements where a concrete footer divides the basement into two sections, and when the area of the basement or slab exceeds 1,500 square feet (ft²)." USEPA, 2010 also notes that "[r]ecommendations about how many SS samples to collect vary, ranging from one SS sample for every 330 ft² (or two to three samples for every average-sized home) to one SS sample for an average residential dwelling of 1,500 ft²."

In Section 4.7 of Ohio EPA, 2010, Ohio EPA recommends the collection of at least two sub-slab soil gas samples with one sample taken in the center of the building's foundation. For foundations greater than 5,000 ft², Ohio EPA suggests that, at a minimum, sub-slab soil gas be collected from biased locations, e.g., directly over source areas, maximum ground water concentration areas or near preferential pathways. If indoor air sampling is subsequently needed, Ohio EPA states that the indoor air samples should be analyzed only for the site-related chemicals detected in subsurface media (e.g., landfill material, groundwater, exterior soil gas) or sub-slab soil gas.

The sampling activities that will be performed at the VI Study buildings will include sub-slab soil vapor, indoor air, crawl space air, and/or outdoor air sampling for VOCs and/or methane. The general VI Study sampling strategy was presented in Section 1.3. The following additional guidelines were used for developing the sampling plans for each building: (1) multiple locations will be sampled at buildings with footprints larger than 1,500 ft² and/or multiple interior compartments (i.e., separate indoor air zones), and (2) the samples for VOC analysis will be collected in 6-liter Summa canisters equipped with flow controllers set to collect the samples over an 8-hour period for industrial and commercial buildings and a 24-hour period for

residential buildings. The proposed sampling strategy and the rationale used in developing the strategy for each VI Study building are provided on Table 1.

CRA will collect a minimum of two samples from each location at each VI Study building unless mitigation is performed after the first sampling event. The Round 1 and 2 sampling events will be approximately 6 months apart to account for seasonal changes. The Round 1 sampling event will be performed in the winter when the surrounding ground is frozen and VI is expected to be highest. If follow-up sampling is required based on the results of the Round 1 sampling event (see Section 5.4), then the follow-up sampling event will also be performed in the winter. The Round 2 sampling event will be performed in the drier mid-summer when methane and VOC generation within the landfill may be highest (e.g., see Table 2 for GP-20 September 2009 and January 2011 sample results). All of the sub-slab soil vapor, crawl space air, indoor air, and outdoor air sample locations at each of the VI Study buildings from the Round 1 and the Round 1 follow-up sampling events (if necessary) will be resampled during the Round 2 sampling event unless mitigation has already been performed at a building. If follow-up sampling is required based on the results of the Round 2 sampling event (see Section 5.4), then the follow-up sampling event will also be performed in the summer.

The field events will be performed by at least two CRA field staff and are expected to take approximately 2 to 3 weeks each. During the first sampling event, a private utility location company will perform a utility clearance before sub-slab soil vapor probe installation at each building.

Sampling will not be performed during storm events or within 48 hours of a significant rain event (i.e., greater than 1 inch of rain in a 24-hour period) because of the potential influence such conditions may have on indoor air, outdoor air, and sub-slab soil vapor. Information on weather conditions (including barometric pressure, air temperature, wind direction, and wind speed) in Moraine, Ohio, during the sampling event will be obtained from Weather Underground's Web site (2011).

The work proposed in this Work Plan will be performed in accordance with the USEPA-approved Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Site-Specific Health and Safety Plan (HASP), and associated addenda that are submitted as Appendix C to this Work Plan.

4.1 SAMPLING LOCATIONS

The proposed VI Study sampling locations were selected to provide spatial coverage of each building with some bias toward the nearby landfill material, groundwater, and/or soil gas

sample locations with elevated VOC and/or methane concentrations. If only one sampling location was proposed for a building, it would be placed toward the center of the building. If multiple sampling locations were proposed for a building, at least one would be placed toward the center of the building. Sub-slab soil vapor sampling locations will be at least 5 feet from exterior walls. Suspected asbestos-containing floor tiles were identified in the north office wing of Building 1 on Parcel 5172; sub-slab soil vapor probes will not be installed in this area.

Indoor and crawl space air proposed VOC sampling locations were placed toward the center of the building. The indoor air methane and carbon dioxide field monitoring will be performed near each of the sub-slab soil vapor probe or crawl space air locations at each building. Crawl space air methane and carbon dioxide field monitoring will be performed at each of the crawl space air VOC sample locations. The indoor and outdoor air Summa canisters and field meter inlets will be placed at a sample height approximately 3 to 5 feet above the slab or ground surface (approximate breathing zone height). The crawl space air sample and field meter inlets will be at least several inches above the slab or ground surface.

The proposed sampling locations for each building are shown on Figures 6 through 31. Contingency indoor air sampling locations are included in these figures, and these locations will be sampled if follow-up sampling is required based on the Round 1 or 2 sampling event results as discussed in Section 5.4. Sample locations may require adjustment in the field depending on the presence of utilities and owner/tenant concerns. Any adjustments will be agreed with USEPA or USEPA's on-site representative at the time of sampling.

An outdoor air sample will be collected for VOC analysis at parcels where indoor or crawl space air samples are collected for VOC analysis to assess ambient concentrations at and adjacent to the buildings at the time of sampling. Additionally, one outdoor air sample will be collected each day sub-slab soil vapor samples are collected for VOC analysis. The outdoor air sample will be collected near the buildings being sampled that day. If multiple parcels are sampled in a single day that are greater than 1,000 feet apart, then multiple outdoor air samples will be collected to ensure local-scale outdoor air concentrations are characterized. Outdoor air methane and carbon dioxide concentrations will be measured each day at each of the VI Study parcels that are being sampled that day. The specific outdoor air sampling locations will be determined in the field at the time of sampling. The outdoor air samples will not be collected in the immediate vicinity of obvious outdoor VOC and/or methane sources (e.g., gasoline powered equipment).

4.2 SAMPLING PROCEDURES

The procedures for the installation and sampling of the sub-slab soil vapor probes and the collection of indoor, crawl space and outdoor air samples are described below. Additional detail is provided in the standard operating procedures in Appendix B.

Before sampling, the buildings will be resurveyed to determine if conditions have changed since the June 2011 building surveys. The Building Physical Survey Questionnaire will be updated as necessary for each building.

Globe Equipment (Buildings 1 and 2 on Parcel 3207) has requested that sample collection occur outside of normal operating hours, i.e., on the weekend, to minimize disruption to the business. To avoid diurnal effects on sub-slab soil vapor concentrations, the samples will be collected during the weekend between 9 a.m. and 5 p.m. CRA will ensure that the heating, ventilation, and air conditioning (HVAC) equipment system is operating in the same manner at the time of sampling as it would during normal operating hours.

4.2.1 SUB-SLAB SOIL VAPOR PROBE INSTALLATION AND SAMPLING

Sub-slab soil vapor probe installation and sampling will be performed in accordance with the SOP in Appendix B.1, which is an addendum to the FSP.

Due to safety concerns, CRA will avoid installing sub-slab gas probes in the vicinity of underground utilities. All proposed sub-slab soil vapor probe locations will be cleared prior to installation through use of a concrete scanner (i.e., hand-held Ground Penetrating Radar unit or equivalent) operated by a private utility locator. Specific details regarding the installation and sampling of the sub-slab vapor probes are provided below.

4.2.1.1 SUB-SLAB SOIL VAPOR PROBE INSTALLATION

As described in detail in the SOP for sub-slab soil vapor probe installation (Appendix B, addendum to the FSP), CRA will use a rotary hammer drill a "shallow" (approximately 1 inch deep) outer hole (7/8 inch in diameter) that partially penetrates the floor slab. CRA will then drill a smaller diameter inner hole (3/8 inch in diameter) into the center of the outer hole, through the floor material and approximately 3 inches into the sub-slab bedding material to create an open cavity.

CRA will clean cuttings from the outer and inner holes using a towel moistened with distilled water or a small portable vacuum cleaner.

To construct the probes, CRA will cut chromatography grade 316 stainless steel tubing (1/4 inch in diameter) to a length that allows the probe to float within the slab thickness to avoid obstruction of the probe with sub-slab bedding material. To complete the probe, female thread connectors will be used for compression fittings and attached to the tubing. A probe cap will be placed on the probe. CRA will construct the probes prior to drilling to minimize exposure time, or venting, of the sub-slab bedding material through the open hole.

CRA will place the sub-slab soil vapor probe in the hole so that the top of the probe is flush with the top of the floor. The top of the probe will have a recessed brass plug. CRA will push or inject 100 percent pure Portland cement slurry into the annular space between the probe and the outer hole. The cement will be allowed to dry for at least 24 hours prior to sampling.

4.2.1.2 SUB-SLAB SOIL VAPOR PROBE PURGING AND LEAK CHECKING

CRA will complete leak testing prior to sample collection by injecting helium into a shroud covering the sub-slab probe, and monitoring for the presence of helium in the purged sub-slab soil vapor using a field meter.

CRA will purge stagnant air from the sub-slab soil vapor probes into Tedlar bags with a lung box pump. CRA will purge one to two liters of sub-slab soil vapor from the probe assembly, into a Tedlar bag. One liter of sub-slab soil vapor will be greater than three volumes from the sub-slab soil vapor probe assembly (probe and attached Teflon® tubing); however the additional purged sub-slab soil vapor is necessary for leak testing and field screening with a photoionization detector (PID) for total VOCs. This also ensures that the sub-slab soil vapor sample is representative of actual vapor concentrations within the sub-slab bedding material. The Tedlar bags will be field screened with the PID and helium detector and emptied outside the building to avoid releasing contaminants within the building.

Elevated methane concentrations (above approximately 5 percent) can interfere with the helium detector, resulting in false positive helium readings. Methane concentrations in sub-slab soil vapors will be measured (field screened) in the purged sub-slab vapor before measuring helium concentrations. If methane is not present at concentrations above approximately 5 percent, then the helium readings are not biased. If methane is present at concentrations above approximately 5 percent and a Summa canister is being collected for VOC analysis, then the sample will be analyzed for helium by the analytical laboratory. However, if methane is present and a Summa canister is not being collected for VOC analysis, the probe will be temporarily patched with modeling clay (to ensure a leak is not present), and the probe will be sampled for methane under the assumption that a leak is not present.

4.2.1.3 SUB-SLAB SOIL VAPOR PROBE SAMPLING FOR METHANE

Following purging and leak checking of the sub-slab soil vapor probe, CRA will collect a second Tedlar bag sample of sub-slab soil vapor to measure pre-sample values of methane, oxygen, and carbon dioxide, using appropriate meters. The Tedlar bag will be field screened and emptied outside the building to avoid releasing contaminants within the building.

The sub-slab soil vapor samples will then be collected into Summa Canisters as detailed in Section 4.2.1.4 at buildings designed for occupancy that have slabs. Following sample collection, CRA will collect sub-slab soil vapor from the probes into Tedlar bags with a lung box in order to measure post-sample methane, carbon dioxide, and oxygen values.

Methane, carbon dioxide, and oxygen levels also will be measured twice at least 8 hours apart at buildings that are not designed for occupancy that have slabs (i.e., where Summa canister sampling will not be performed). Approximately 0.5-liter of sub-slab soil vapor will be purged from these probes before the second measurement.

The following information from the USEPA (2005) Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities will be considered when selecting times for measuring methane levels: "Highest methane concentrations occur in the warmer summer months, and concentrations are higher during the heat of the day compared to measurements taken during morning hours. Landfill gas levels in soils tend to be higher during dry periods and lower after significant rainfall events."

Total VOCs in sub-slab soil vapor will be measured with a PID both times the methane, carbon dioxide, and oxygen concentrations are measured at each probe.

CRA will measure the levels of methane, carbon dioxide and oxygen in the sub-slab vapor beneath the structure² using a portable combustible gas meter, specifically RKI GX-2003, and LandTec GEM 2000. RKI GX-2003 responds to all combustible gases present (reported as percent LEL), and also displays percent volume of methane. LandTec GEM 2000 reports the concentration of methane in units of percentage of the lower explosive limit (LEL) of methane (i.e., 0 to 100 percent of LEL). Both the RKI GX-2003 and LandTec GEM 2000 measure the concentrations of oxygen, carbon dioxide, carbon monoxide, and hydrogen sulfide.

To confirm methane field readings, a subset of the sub-slab soil vapor samples collected in Summa canisters for VOC analysis (equal or greater than 20 percent of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946. The confirmatory

² As noted above, sub-slab measurements will be made from the Tedlar bags and not directly from the sub-slab.

samples will be used to verify the non-detect to low range methane readings measured with the field meters (i.e., if methane concentrations are measured with the field meter above the screening levels, an immediate or rapid response will be necessary to eliminate the explosive hazard and confirmatory laboratory samples aren't necessary).

4.2.1.4 SUB-SLAB SOIL VAPOR SAMPLING FOR VOCs

The sub-slab soil vapor samples will be collected into 6 L Summa Canisters equipped with flow controllers set to collect the sample over an 8-hour period for commercial and industrial buildings, and a 24-hour period for residential buildings.

During sample collection, CRA will check each Summa Canister periodically to ensure that the canister pressure has not reached zero; at a minimum, the canisters will be checked several hours before the end of the sampling period. Canisters that reach zero pressure will not be analyzed and a new sample will be collected at these locations.

4.2.2 INDOOR AIR SAMPLING FOR VOCs

Indoor and crawl space air sampling will be performed in accordance with the SOP for indoor, outdoor, and crawl space air sampling (Appendix B.2, addendum to the FSP).

The indoor and crawl space air samples will be collected into 6-liter Summa canisters equipped with flow controllers set to collect the sample over an 8-hour period for commercial and industrial buildings, and a 24-hour period for residential buildings. The indoor air sampling period will coincide with the sub-slab soil gas sampling period at each building where both sample types are being collected.

When indoor or crawl space air samples are collected, CRA will also collect an outdoor air sample adjacent to the structure as per CRA's SOP.

CRA will check each Summa Canister periodically to ensure that the canister pressure has not reached zero; at a minimum, the canisters will be checked several hours before the end of the sampling period. Canisters that reach zero pressure will not be analyzed and a new sample will be collected at these locations.

4.2.3 INDOOR AND CRAWL SPACE AIR SAMPLING FOR METHANE

Crawl space air methane, carbon dioxide, and oxygen levels will be measured at the beginning and end of the crawl space air Summa canister collection period.

Indoor air methane, carbon dioxide, and oxygen levels will be measured at each building when sub-slab soil vapor or crawl space air levels are measured (i.e., at the beginning and end of the Summa canister collection period). Methane, carbon dioxide, and oxygen levels also will be measured twice at least 8 hours apart at buildings that are not designed for occupancy that have slabs (i.e., where Summa canister sampling will not be performed).

CRA will measure the methane, carbon dioxide and oxygen levels in indoor and crawl space air using portable combustible gas meters, specifically RKI GX-2003 and LandTec GEM 2000, as discussed in Section 4.2.1.3 above.

In addition, a subset of the indoor and crawl space air samples collected in Summa canisters for VOC analysis (equal or greater than 20 percent of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946, to confirm methane field readings. As only one indoor air and two crawl space air samples are proposed for the initial round of sampling, one sample will be submitted to the laboratory for analysis of methane. One of the two crawl space air samples will be submitted to the laboratory for analysis of methane; the sample with the higher methane reading that is below the screening levels will be selected. If either of the crawl space air samples has methane concentrations measured with the field meter above the screening levels, then that sample will not be sent to the laboratory for analysis of methane because an immediate or rapid response will be necessary to eliminate the explosive hazard and confirmatory laboratory samples are not necessary.

4.2.4 OUTDOOR SAMPLING FOR VOCs

Outdoor air sampling for VOCs will be conducted in accordance with the SOP for indoor, outdoor, and crawl space air sampling (Appendix B.2, addendum to the FSP).

The outdoor air samples will be collected into 6-liter Summa canisters equipped with flow controllers set to collect the sample over an 8-hour period for commercial and industrial properties, and a 24-hour period for residential properties. The outdoor air sampling period will coincide with the indoor and crawl space air sampling period. Measures will be taken to reduce the potential for rainwater to enter the Summa canister; the canister may be placed under a protective cover or the inlet will be turned downward.

CRA will check each Summa Canister periodically to ensure that the canister pressure has not reached zero; at a minimum, the canisters will be checked several hours before the end of the sampling period. Canisters that reach zero pressure will not be analyzed and a new sample will be collected at these locations.

Outdoor air methane, carbon dioxide, and oxygen levels will be measured at the beginning and end of the outdoor air Summa canister collection period. The methane, carbon dioxide, and oxygen levels will be measured in indoor and crawl space air using a LandTec GEM 2000 portable LFG analyzer. Laboratory confirmation of outdoor air methane field readings will not be performed, as it is unlikely methane will be detected in outdoor air and the field screening is considered to be adequate for the purposes of this study.

4.2.5 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Field duplicate samples will be collected at a frequency of 10 percent per sample media for VOC analysis. The sample media are (1) sub-slab soil vapor and (2) indoor, crawl space, and outdoor air. Duplicate samples will be collected in the same manner and from the same location as the normal samples are collected. A stainless-steel T-connector will be used to connect two Summa canisters together so the parent and duplicate sample are collected concurrently from the same intake.

Quality assurance (QA)/quality control (QC) for the methane field screening results will be accomplished by: 1) measuring methane twice (at least 8 hours apart) at each sub-slab soil vapor, indoor air, and crawl space air location; 2) submitting 20 percent of the sub-slab soil vapor Summa canisters and 20 percent of the indoor and crawl space air Summa canisters for laboratory analysis of methane by ASTM Method D1946.

4.2.6 SAMPLE ANALYSIS

CRA will submit the Summa Canister samples under chain of custody protocols to the laboratory for VOCs analysis in accordance with USEPA TO-15. The full TO-15 list will be reported for each sample. The TO-15 list will include at a minimum the constituents listed on Tables 2 - 6. The VOC samples collected from residential buildings will also be analyzed by the TO-15 low-level method for 1,1,2,2-tetrachloroethane, bromodichloromethane, dibromochloromethane, and naphthalene in order to achieve reporting limits less than the screening levels (see Section 3, Step 6).

Soil concentrations of benzo(b)fluoranthene were greater than USEPA industrial soil criteria in samples collected from Valley Asphalt Parcel 5054 (TT-5 and TT-7). According to Table 1 of the *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (USEPA 2002), benzo(b)fluoranthene is sufficiently toxic and volatile for VI to be a potential concern. However, benzo(b)fluoranthene has a high molecular weight (252.3 grams per mole) and low vapor pressure (5×10^{-7} mm mercury at 20 to 25 degrees Celsius [ToxProbe Inc. 2011]), and does not easily volatilize.

Further, sub-slab vapor sampling techniques to determine the soil vapor concentration of benzo(b)fluoranthene are not available and ambient air or occupational health methods for PAH sampling are not readily transferable to sub-slab vapor sampling. There is insufficient data to develop benzo(b)fluoranthene soil volatilization to indoor air inhalation criteria (Michigan Department of Environmental Quality 2011). Therefore, CRA does not propose to include benzo(b)fluoranthene in the VI Study. In comments dated July 19, 2011, USEPA accepted the proposal to not include benzo(b)fluoranthene in the VI Study.

All Summa canisters used for the VI Study will be individually certified by the analytical laboratory to ensure they are free of contamination before collecting the samples. The results of this certification will be included in the VI Investigation Report.

A subset of the sub-slab soil vapor, crawl space air and indoor air samples (equal or greater than 20 percent of the total number of samples) will be submitted for analysis of methane by ASTM Method D1946, to confirm methane field readings.

5 DATA EVALUATION AND REPORTING

The VI assessment will be conducted using multiple lines of evidence and in accordance with USEPA Region 5 (2010), ITRC (2007), USEPA (2002), and Ohio EPA (2010) VI guidance. The sub-slab soil vapor, indoor air, and crawl space air data collected during the VI Study will be compared to the screening levels detailed in Section 5.2. Multiple lines of evidence will be considered when determining if the measured crawl space or indoor air concentrations are Site-related and due to VI. Recommendations for further investigation, mitigation, and monitoring will be made in accordance with the decision rules described in Step 6 of the DQOs (Section 3) and detailed in Section 5.4, which are based on Section 8 (Decision Making at Vapor Intrusion Sites) of the USEPA (2010) Region 5 Vapor Intrusion Guidebook.

5.1 DATA VALIDATION

Data quality validation will be performed to assess the effects of the overall field and analytical processes on the usability of the data before evaluation and reporting. CRA will review final results and supporting quality assurance/quality control (QA/QC data). CRA will complete a full data validation on the results, as the sub-slab soil vapor, crawl space air, indoor air, and outdoor air analytical results will be used to determine risks to receptors.

CRA chemistry staff will validate the analytical data in accordance with Section K.5.9.2 of the QAPP (CRA 2008).

5.2 SCREENING LEVELS

5.2.1 VOC SCREENING LEVELS

The screening levels for VOCs are based on the USEPA RSLs for air (USEPA 2011). The RSLs are derived assuming a 10^{-6} target ELCR level or a HI of 1. RSLs are not provided for several constituents; RSLs for similar constituents will be used as evaluation surrogates for these constituents (Tables 5 through 7). Some VOCs have both cancer and non-cancer based RSLs; it is important to consider both types of screening levels when calculating cumulative risks and hazards.

The USEPA released the final health assessment for trichloroethene (TCE) to the Integrated Risk Information System (IRIS) database on September 28, 2011. Updated TCE air RSLs were calculated using a sample spreadsheet that USEPA provided in the IRIS documentation³ which includes an adjustment for the mutagenic mode of action (MMOA) for kidney cancer for the

³ located at http://hero.epa.gov/index.cfm?action=search.view&reference_id=758648

cancer-based RSLs. The worksheets showing the TCE air RSL calculation are provided in Appendix D. The screening levels were then developed using the updated TCE air RSLs.

SVSLs were derived by applying the USEPA (2010) Vapor Intrusion Guidebook default soil gas-to-indoor air attenuation factor of 0.1 to the RSLs. Crawl space air screening levels (CSSLs) were derived by applying the USEPA (2010) Vapor Intrusion Guidebook default crawl space air-to-indoor air attenuation factor of 1 to the RSLs.

Industrial screening levels (based on the industrial air RSLs) will be used to evaluate the buildings with commercial or industrial use. Residential screening levels (based on the residential air RSLs) will be used to evaluate the residential buildings (i.e., Parcel 3253).

The most recent USEPA RSLs will be used to recalculate the VOC screening levels (Tables 5 – 7) prior to screening analytical data throughout the VI Study. The next round of updates to the RSLs will include the updated TCE toxicity factor, and the newest TCE RSL will be used to replace the one calculated for this Work Plan.

Multiple sets of screening levels for VOCs were derived from the RSLs:

- SVSLs for further investigation (i.e., concurrent indoor air and sub-slab soil vapor sampling within 30 days) corresponding to an ELCR = 10^{-6} , or HI = 0.1 in indoor air assuming a default attenuation factor of 0.1 (Table 5).
- SVSLs for monitoring (i.e., to determine if ongoing monitoring is necessary when measured indoor air VOC concentrations are below the indoor air screening levels [IASLs] for mitigation) corresponding to an ELCR = 10^{-5} or HI = 1 in indoor air assuming a default attenuation factor of 0.1 (Table 5).
- CSSLs for further investigation (i.e., concurrent indoor and crawl space air sampling within 30 days) corresponding to an ELCR = 10^{-5} or HI = 1 in indoor air assuming a default attenuation factor of 1 (Table 6).
- IASLs for mitigation corresponding to an ELCR = 10^{-5} or HI = 1 in indoor air (Table 7).
- IASLs for high priority / rapid response (i.e., mitigation within a few weeks) corresponding to an ELCR = 10^{-4} or HI = 10 in indoor air (Table 7).

5.2.2 METHANE SCREENING LEVELS

The methane screening levels were obtained from the Ohio Administrative Code (OAC) 3745-27-12 and the USEPA (2010) Vapor Intrusion Guidebook. The methane results will be compared to the following screening levels:

- SVSL for immediate response (i.e., immediately notify appropriate authorities [e.g., USEPA, Ohio EPA, fire department, and health district] and immediately eliminate explosive hazard through mitigation or removal): 100 percent of the LEL (OAC 3745-27-12). One hundred percent of the LEL for methane equates to methane levels of approximately 28,000 parts per million (ppm) by weight or 5 percent (50,000 ppm) methane by volume.
- IASL and CSSL for immediate response (i.e., immediately notify appropriate authorities [e.g., USEPA, Ohio EPA, fire department, health district] and immediately eliminate explosive hazard through mitigation or removal): 25 percent of the LEL (OAC 3745-27-12). Twenty-five percent of the LEL for methane equates to methane levels of approximately 7,000 ppm by weight or 1.25 percent (12,500 ppm) methane by volume.
- SVSL for rapid response (i.e., mitigation within weeks): 10 percent of the LEL (USEPA, 2010). Ten percent of the LEL for methane equates to methane levels of approximately 2,800 ppm by weight or 0.5 percent (5,000 ppm) methane by volume.
- IASL and CSSL for rapid response (i.e., mitigation within weeks): 1 percent of the LEL (USEPA, 2010). One percent of the LEL for methane equates to methane levels of approximately 280 ppm by weight or 0.05 percent (500 ppm) methane by volume.

5.3 DATA EVALUATION

The multiple lines of evidence that may be used to evaluate the VI Study data include, but are not limited to, the following:

- Sub-slab soil vapor, crawl space air, and indoor air VOC sample data compared to the screening levels detailed in Section 5.2;
- Cumulative cancer and non-cancer risks for each sub-slab soil vapor, crawl space air, and indoor air VOC sample;

- Sub-slab soil vapor, crawl space air, and indoor air methane field readings compared to the screening levels detailed in Section 5.2;
- Indoor air-to-sub-slab soil vapor VOC ratios;
- Indoor air-to-crawl space VOC ratios;
- Crawl space air-to-outdoor air VOC ratios;
- Indoor air-to-outdoor air VOC ratios;
- VOC ratios within and between samples;
- Building characteristics and survey results;
- Presence of potential indoor VOC sources;
- The 2009 soil vapor sample VOC and methane results (Tables 1 through 3); and
- Site geology and history.

The data collected during the VI Study will be used to update the CSM for each VI Study building. Recommendations for further investigation, mitigation, and remediation will be made in accordance with the decision rules described in Section 5.4.

5.4 DECISION RULES

The following decision rules will be used to determine if additional actions are required to further investigate or mitigate the VI pathway at the VI Study buildings.

5.4.1 DECISION RULES FOR VOC ANALYTICAL RESULTS

- Multiple lines of evidence will be considered when determining if the measured crawl space or indoor air concentrations are Site-related (i.e., from contaminated materials in the landfill area or from groundwater beneath the landfill) and are due to VI at each VI Study building. Example lines of evidence include, but are not limited to (1) indoor-to-outdoor and/or indoor-to-sub-slab VOC ratios; (2) building characteristics; (3) VOC ratios within and between samples; and (4) Site geology/history. Refer to the USEPA (2010) Region 5 Vapor Intrusion Guidebook for additional discussion.
- In general, decisions regarding mitigation to address the VI pathway at each VI Study building will be made considering indoor air and sub-slab soil vapor (or crawl space air) VOC levels. Site-related indoor air VOC levels from VI will be the primary determinant for mitigation actions. However, if sub-slab soil vapor concentrations are so elevated that there is a potential for future VI human health risk (e.g., if foundation conditions deteriorate or

pressure gradients change), then mitigation to prevent future exposure at a building may be required even if current IA concentrations do not exceed IASLs.

- In general, a no further action (as part of this work plan) decision for a VI Study building should be based on sampling data performed during assumed worst-case conditions; these depend on seasonal groundwater level and building heating and cooling factors, as well as seasonal conditions which may affect methane and VOC production within the landfill. Therefore, at this Site, a no further action decision (as part of this work plan) will be based on two rounds of sampling data under both potential worst-case conditions (i.e., both winter and mid-summer events should be included).
- The PRPs may decide to conduct concurrent indoor air sampling with the sub-slab soil vapor (or crawl space air) sampling during the Round 1 sampling event; or perform mitigation in lieu of further investigation of the VI pathway at any of the VI Study buildings at any time.
- If only sub-slab soil vapor samples are collected and measured VOC levels meet or exceed applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-6} or HI of 0.1 in indoor air assuming a default attenuation factor of 0.1 at any of the probes within a building during either the Round 1 or 2 sampling events, then CRA will immediately notify USEPA on behalf of the Respondents and collect concurrent indoor/outdoor air and sub-slab soil vapor VOC samples within 30 days of receiving the complete set of analytical results for that sampling event to further assess the VI human health risk at that building. However, if measured sub-slab soil vapor VOC levels exceed 1,000 to 10,000 times the applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-6} or HI of 0.1 in indoor air assuming a default attenuation factor of 0.1 at any of the probes within a building during either the Round 1 or 2 sampling events, then a more rapid response may be required if the building is currently occupied. The rapid response will include expedited indoor air sampling and interim mitigation measures to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks and other entry points in the slab. A rapid response is not necessary at unoccupied buildings as long as the Respondents ensure that the building remains unoccupied until indoor air sampling is performed.
- If only sub-slab soil vapor samples are collected and measured VOC levels are less than applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-6} or HI of 0.1 in indoor air assuming a default attenuation factor of 0.1 during both Round 1 and 2 sampling events (i.e., winter and mid-summer) at all of the probes within a building, then no further action to investigate or mitigate the VI pathway is necessary at that building as part of this VI Work Plan.

- If only crawl space air vapor samples are collected and site-related measured VOC levels meet or exceed applicable CSSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 1 during either the Round 1 or 2 sampling events (i.e., winter and mid-summer), then CRA will immediately notify USEPA on behalf of the Respondents and collect concurrent indoor/outdoor and crawl space air VOC samples within 30 days of receiving the complete set of analytical results for that sampling event to further assess the VI human health risk at that building. However, if measured crawl space air VOC levels exceed 10 to 100 times the applicable CSSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 1 at any of the sampling locations within a building during either the Round 1 or 2 sampling events, then a more rapid response may be required if the building is currently occupied. The rapid response will include expedited indoor air sampling and interim mitigation measures to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) or venting of the crawl space (e.g., removing the trailer skirting), and sealing cracks and other entry points in the floor. A rapid response is not necessary at unoccupied buildings as long as the Respondents ensure that the building remains unoccupied until indoor air sampling is performed.
- If only crawl space air samples are collected and site-related measured VOC levels are less than applicable CSSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 1 during both Round 1 and 2 sampling events (i.e., winter and mid-summer), then no further action to investigate or mitigate the VI pathway is necessary at that building as part of this VI Work Plan.
- If site-related indoor air VOC levels due to VI meet or exceed applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-4} or HI of 10 at any indoor air sample location within a building during any sampling event, then CRA will immediately notify USEPA and submit a work plan to perform rapid mitigation (i.e., within a few weeks) on behalf of the Respondents, including operation and maintenance, within 15 days of receiving the complete set of preliminary analytical data for that sampling event, to address the human health risk at that building. Additionally, interim mitigation measures should be performed at occupied buildings to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks and other entry points in the slab or floor.
- If site-related indoor air VOC levels due to VI meet or exceed applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 at any indoor air sample location within a building during any sampling event, then CRA will submit a

work plan on behalf of the Respondents within 30 days of receiving the complete set of preliminary analytical data for that sampling event to perform mitigation (including operation and maintenance) to address the human health risk at that building. Additionally, interim mitigation measures should be performed at occupied buildings to reduce potential indoor air VOC concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks and other entry points in the slab or floor.

- If site-related indoor air VOC levels due to VI are less than applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 and sub-slab soil vapor VOC levels are less than applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 0.1 at a building during at least two consecutive sampling events which include winter and mid-summer events, then no further action to investigate or mitigate the VI pathway is necessary at that building as part of this VI Work Plan.
- If site-related indoor air VOC levels due to VI are less than applicable IASLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 and sub-slab soil vapor VOC levels during any sampling event meet or exceed applicable SVSLs or cumulative risks/hazards corresponding to a target ELCR of 1×10^{-5} or HI of 1 in indoor air assuming a default attenuation factor of 0.1 at a building, then CRA will submit a monitoring plan on behalf of the Respondents for the building within 30 days of receipt of the complete set of preliminary analytical data from the second indoor air sampling event.

If the Round 1 or 2 sub-slab soil vapor or crawl space air VOC sampling results trigger further investigation (Table 5 and 6) (i.e., concurrent indoor air and sub-slab soil vapor [or crawl space air] VOC samples within 30 days of receiving the complete set of analytical results from that sampling event), then the indoor air contingency locations identified on Figures 6 - 31 and the indoor air sampling procedures detailed in Section 4.2.2. will be utilized. An additional work plan (or work plan addendum) will not be required.

5.4.2 DECISION RULES FOR METHANE ANALYTICAL RESULTS

- If sub-slab soil vapor methane levels meet or exceed 100% of the LEL (5 percent methane by volume) at any of the sub-slab soil vapor probes within a building during any sampling event, then CRA will immediately notify appropriate authorities (e.g., USEPA, Ohio EPA, fire department, health district) on behalf of the Respondents and immediately eliminate explosive hazard at that building through mitigation or removal (OAC 3745-27-12).

- If indoor or crawl space air methane levels meet or exceed 25% of the LEL (1.25% methane by volume) at any of the sample locations within a building during any sampling event, then CRA will immediately notify appropriate authorities (e.g., USEPA, Ohio EPA, fire department, health district) on behalf of the Respondents and immediately eliminate explosive hazard at that building through mitigation or removal (OAC 3745-27-12). Additionally, interim mitigation measures should be performed as soon as possible to reduce indoor air methane concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks or other entry points in the slab or floor.
- If sub-slab soil vapor methane levels meet or exceed 10% of the LEL (0.5% methane by volume) at any of the sub-slab soil vapor probes within a building during any sampling event, then CRA will immediately notify USEPA on behalf of the Respondents and perform rapid response (i.e., mitigation within a few weeks) to eliminate explosive hazard at that building (USEPA, 2010).
- If indoor or crawl space air methane levels meet or exceed 1% of the LEL (0.05% methane by volume) at any of the sample locations within a building during any sampling event, then CRA will immediately notify USEPA on behalf of the Respondents and perform rapid response (i.e., mitigation within a few weeks) to eliminate explosive hazard at that building (USEPA, 2010). Additionally, interim mitigation measures should be performed as soon as possible to reduce indoor air methane concentrations due to VI such as HVAC modifications (e.g., increasing the outdoor air intake) and sealing cracks or other entry points in the slab or floor.
- If sub-slab soil vapor methane levels are less than 10% of the LEL or crawl space air methane levels are less than 1% of the LEL (depending on if sub-slab soil vapor or crawl space air samples were collected at the building) AND indoor air methane levels are less than 1% of the LEL during both Round 1 and 2 sampling events (i.e., winter and mid-summer), then no further action to address explosive hazards are necessary at that building as part of this VI Work Plan (USEPA, 2010).

Immediate or rapid response actions to address explosive hazards will be performed regardless of occupancy status.

5.5 REPORTING

CRA will post the preliminary analytical results to the South Dayton Dump and Landfill file transfer protocol (ftp) site immediately upon receipt and the validated analytical results to the South Dayton Dump and Landfill file transfer protocol (ftp) site immediately upon completion of validation. CRA will notify USEPA immediately on behalf of the Respondents of any VOC or

methane analytical results or field measurements that exceed the screening levels presented in Section 5.2 and Tables 5 – 7, or if cumulative risks/hazards exceed the ELCR or HI values that the screening levels are based on.

CRA will provide the results and corresponding evaluation after each sampling event to USEPA within 30 days of receiving the complete set of preliminary analytical data on behalf of the Respondents. Data tables showing the VOC and methane analytical data and the methane field measurements compared to the screening levels detailed in Section 5.2 and provided on Tables 5 through 7 will be included, and exceedances of the screening levels will be identified on the tables. Any deviations from this Work Plan will be discussed. The CSMs for the three and one-half buildings for which CSMs were not included in this Work Plan will be provided after the Round 1 sampling event. The buildings that require follow-up sampling or mitigation will be identified.

A final draft VI Investigation Report will provide a summary of each of the sampling events performed during the VI Study. The report will document the procedures and results of the VI Study sampling events. Summary data tables showing the VOC and methane analytical data and the methane field measurements at each of the VI Study sampling locations from each of the sampling events compared to the screening levels detailed in Section 5.2 and provided on Tables 5 through 7 will be included, and exceedances of the screening levels will be identified in the tables. The CSMs for each of the VI Study buildings will be updated with the VI Study sampling data and included in the report. The VI Study data will be evaluated as discussed in Section 5.3 and with the decision rules provided in Section 5.4. The report will be submitted within 60 days of receiving the complete set of preliminary analytical data from the final sampling event (i.e., either the Round 2 or Round 2 follow-up sampling event depending on the results of the Round 2 sampling events).

The VI Report will be finalized following receipt of comments from USEPA.

Additionally, CRA will prepare draft letters on behalf of the Respondents with analytical data tables and figures presenting the VI Study results for each of the buildings for USEPA to submit to the building owners and occupants after each of the sampling events.

If it is determined that mitigation is required at any of the VI Study buildings after any of the sampling events, then a mitigation work plan for each building will be submitted to USEPA for review and approval within the timeframes specified in Section 5.4. Each mitigation work plan will include the technical specifications, and an operation and maintenance plan for the mitigation system. The mitigation work plans will be prepared in accordance with Sections 9

and 10 (Mitigation Options, and Post-Mitigation Issues) of the USEPA (2010) Region 5 Vapor Intrusion Guidebook.

If it is determined that monitoring is required at any of the VI Study buildings after any of the sampling events, then a VI monitoring work plan for each building will be submitted to USEPA for review and approval within 30 days of receipt of the complete set of preliminary analytical data from the second indoor air sampling event.

Monthly progress reports submitted to USEPA during the investigative work will include the information required for monthly progress reports as described in the Administrative Settlement Agreement and Order on Consent (ASAOC).

6 SCHEDULE

Field work for the Round 1 sampling event will begin no later than the first week of December so that the Round 1 follow-up sampling event (if necessary) would be performed no later than mid-March (i.e., before the beginning of spring which occurs on March 20, 2012); therefore, the follow-up indoor air sampling will be performed in the winter (i.e., one of the two potential worst-case seasons for VI sampling).

Field work for the Round 2 sampling event will begin no later than the first week of July so that the Round 2 follow-up sampling event (if necessary) would be performed no later than mid-September (i.e., before the beginning of fall which occurs on September 22, 2012); therefore, the follow-up indoor air sampling will be performed in the summer (i.e., one of the two potential worst-case seasons for VI sampling).

If either Round 1 or 2 follow-up sampling events are required, then those sampling events will be performed within 30 days of receiving the complete set of the preliminary analytical data from the Round 1 or 2 sampling event.

If, for some reason, access cannot be obtained at a specific building during any sampling event, then the Respondents will immediately notify USEPA in accordance with the provisions in the ASAO.

Timeframes for submittal of data, sampling event results and assessments, the final report, and any necessary mitigation or monitoring work plans are addressed in Section 5.5.

7 REFERENCES

Conestoga-Rovers & Associates (CRA) - Quality Assurance Project Plan Remedial Investigation/Feasibility Study, September 2008 (CRA, 2008).

Conestoga-Rovers & Associates (CRA) - Streamlined Remedial Investigation and Feasibility Study Report for Operable Unit One (OU1), June 2011 (CRA, 2011).

Interstate Technology Regulatory Council (ITRC) - Vapor Intrusion Pathway: A Practical Guide, January 2007 (ITRC, 2007).

Michigan Department of Environmental Quality. 2011. Revised Part 201 Cleanup Criteria and Part 213 Risk-based Screening Levels Attachment 1 Table 3 Soil: Nonresidential. March 25.

Office of Solid Waste and Emergency Response (OSWER) - Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), November 2002 (USEPA, 2002).

Ohio Environmental Protection Agency (Ohio EPA) - Sample Collection and Evaluation of Vapor Intrusion to Indoor Air Guidance Document, May 2010 (Ohio EPA, 2010).

ToxProbe Inc. 2011. Ten Carcinogens in Toronto. Benzo[a]pyrene and other polycyclic aromatic hydrocarbons - Definition of Polycyclic Aromatic Hydrocarbons (PAH)
http://www.toronto.ca/health/pdf/cr_appendix_b_pah.pdf. Prepared for Toronto Public Health.

United States Environmental Protection Agency (USEPA) - Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, September 2005 (USEPA, 2005).

United States Environmental Protection Agency (USEPA) - Region 5 - Vapor Intrusion Guidebook, October 2010 (USEPA, 2010).

United States Environmental Protection Agency (USEPA). 2002. *Office of Solid Waste and Emergency Response Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)*. November.

United States Environmental Protection Agency (USEPA). 2011. Indoor Air Regional Screening Levels.

Weather Underground. 2011. Web site <http://www.wunderground.com>.

Commercial/Industrial Worker

Working over Plume

Resident Living over Plume

Basement or Crawl Space

Without Basement

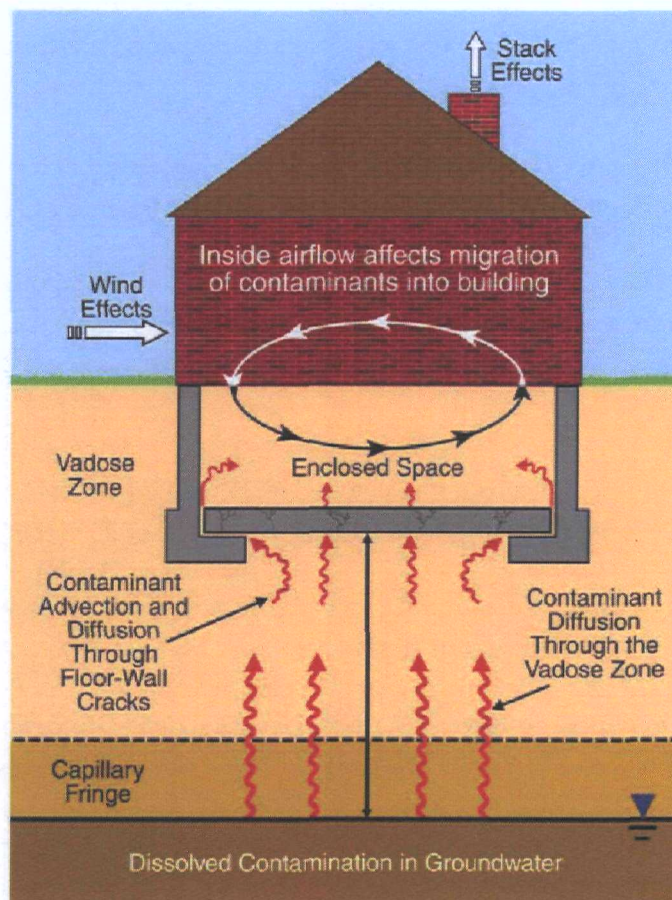


figure 1

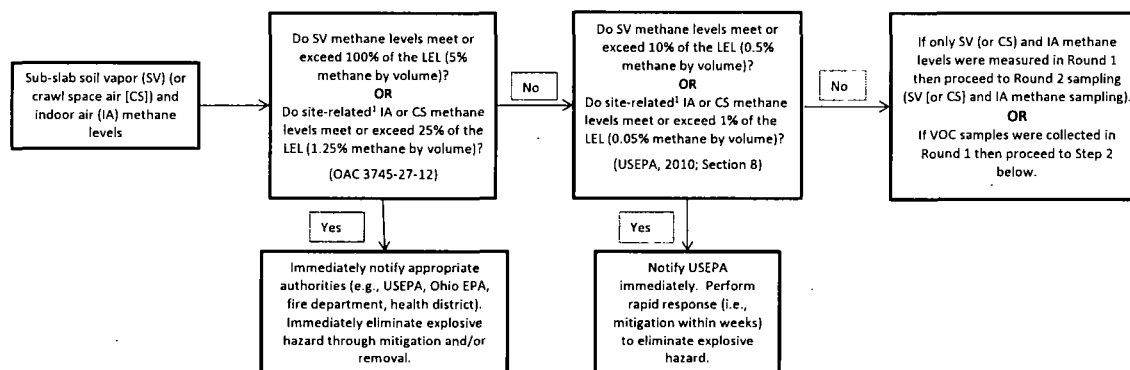
CONCEPTUAL SITE MODEL ILLUSTRATING VAPOR INTRUSION SOUTH DAYTON DUMP AND LANDFILL SITE

Moraine, Ohio



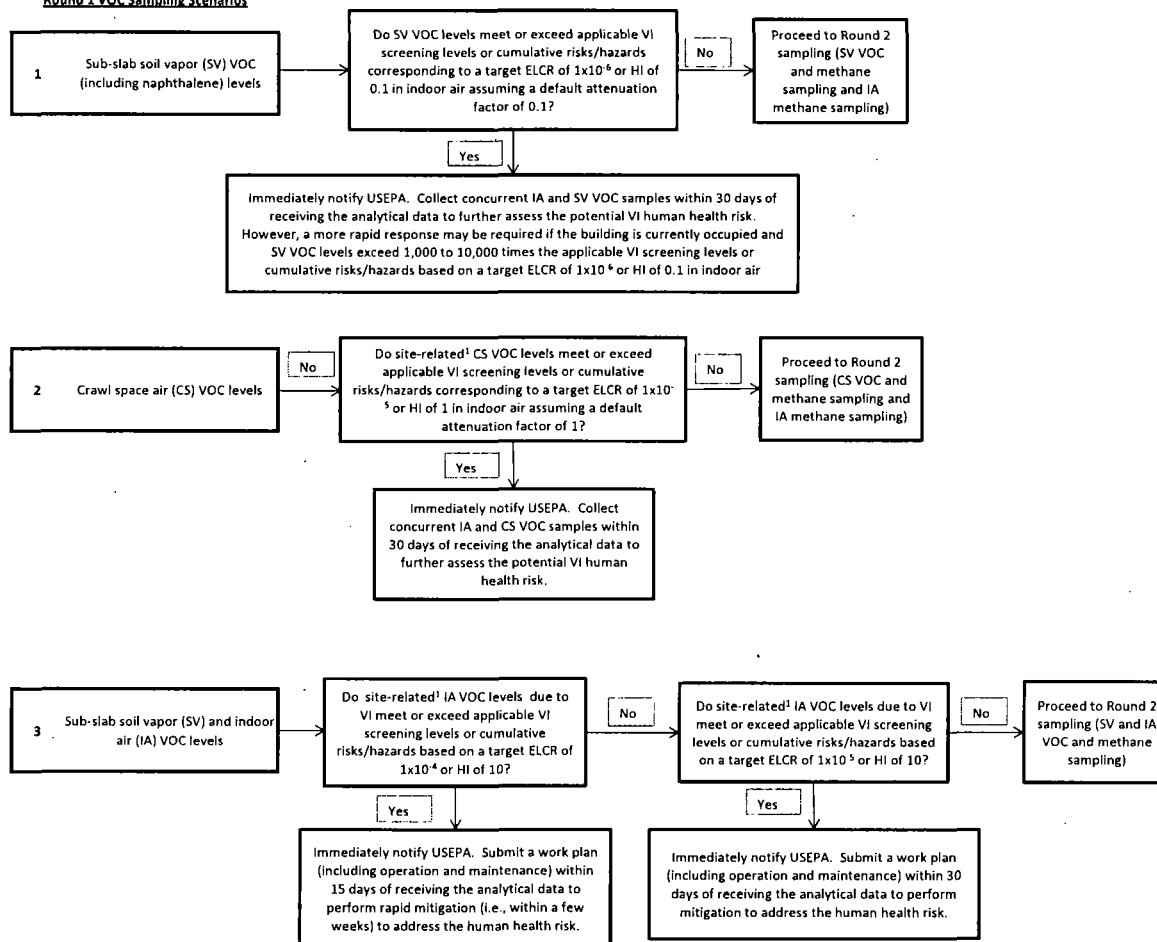
SOURCE:
INTERSTATE TECHNOLOGY & REGULATORY COUNCIL,
VAPOR INTRUSION TEAM, JANUARY 2007,
VAPOR INTRUSION PATHWAY: A PRACTICAL GUIDE

Step 1 - Evaluate Potential Explosive Hazard Using Methane Levels



Step 2 - Evaluate Potential Human Health Risk Using VOC Levels (USEPA, 2010; Section 8)

Round 1 VOC Sampling Scenarios



Notes:

This flow chart depicts the decision making process that will be used to evaluate the Round 1 sampling data and the potential next steps in the VI evaluation for each of the VI Study buildings. Additional information on the decision rules is provided in Section 5.4. The screening levels referenced in this flow chart are detailed in Section 5.2 and are provided in Tables 5 - 7. Sampling data collected in any follow-up sampling events and in the Round 2 sampling event will be evaluated using the decision rules provided in Section 5.4 (i.e., decision flow charts for follow-on sampling events and Round 2 are not included in this work plan).

¹ - Multiple lines of evidence will be considered when determining if the measured crawl space or indoor air concentrations are site-related and due to VI. Example lines of evidence include, but are not limited to (1) indoor-to-outdoor and/or indoor-to-sub-slab VOC ratios; (2) building characteristics; (3) VOC ratios within and between samples; and (4) site geology/history. Refer to the USEPA (2010) Region 5 VI Guidebook for additional discussion.

CS - crawl space
ELCR - excess lifetime cancer risk
HI - hazard index
IA - indoor air
LEL - lower explosive limit
OAC - Ohio Administrative Code

Ohio EPA - Ohio Environmental Protection Agency
SV - solid vapor
USEPA - United States Environmental Protection Agency
VI - vapor intrusion
VOC - volatile organic compound

FIGURE 2

Vapor Intrusion Sampling Decision Flow Chart for Round 1
South Dayton Dump and Landfill Site
Moraine, Ohio

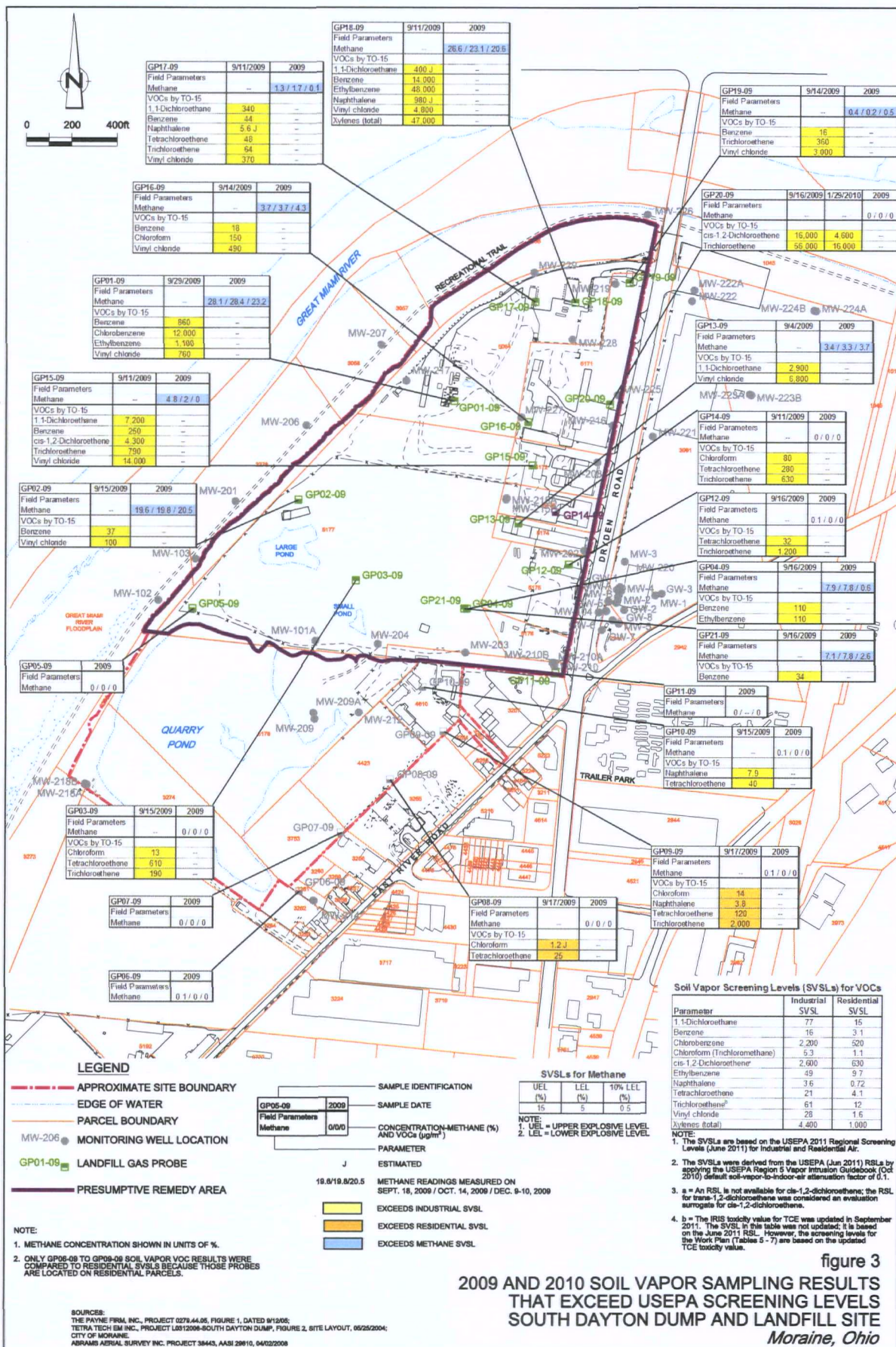


figure 3
2009 AND 2010 SOIL VAPOR SAMPLING RESULTS
THAT EXCEED USEPA SCREENING LEVELS
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SENT VIA FEDEX

November 4, 2011

Mr. Stephen Quigley, P.E.
Principal-in-Charge/Project Manager
Conestoga-Rovers & Associates Ltd.
651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

RE: EPA Modified Vapor Intrusion Study Work Plan
South Dayton Dump and Landfill Site, Moraine, Ohio

Dear Mr. Quigley:

This letter is to notify you the U.S. Environmental Protection Agency (EPA) has modified Conestoga Rovers & Associates (CRA's) Vapor Intrusion Study Work Plan (VI Work Plan) for the South Dayton Dump and Landfill Site (Site). An electronic copy of the EPA-approved, modified VI Work Plan is attached.

EPA's modifications to CRA's VI Work Plan were made consistent with Paragraph 42 of the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility, Docket VW-06-C-852 (ASAOC), which states:

After review of any plan, report, or other item that is required to be submitted for approval pursuant to this Settlement Agreement, including the SOW, U.S. EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that Respondents modify the submission; or (e) any combination of the above. However, U.S. EPA shall not modify a submission without first providing Respondents at least one notice of deficiency and an opportunity to cure within 21 days, except where to do so would cause serious disruption to the Work or where previous submission(s) have been disapproved to material defects.

Respondents have, to date, submitted three versions of the required VI Work Plan report dated December 17, 2010, July 7, 2011 and August 5, 2011, respectively. EPA has provided the Respondents two opportunities to correct deficiencies in the

Respondents' VI Work Plan and submit a plan that is acceptable to the Agency. Notwithstanding comments provided via email and teleconference, and formal comments EPA provided to the Respondents on the first two submittals in letters dated March 17, 2011, May 11, 2011 and July 19, 2011, EPA could not approve the third document without additional changes.

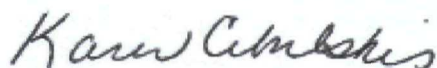
Consistent with Paragraph 43 of the ASAOC, the Respondents shall proceed to undertake the sampling required by the modified VI Work Plan. As required by Paragraph 37(d) of the ASAOC, the Respondents shall confirm their willingness to perform the sampling in the modified VI Work Plan in writing within 7 days of your receipt of this request. In your notification, please also confirm that you will start the field work for the sampling no later than the first week of December, 2011. This will allow the initial subslab sampling and any follow-up, concurrent indoor air and subslab sampling, if required, to be completed within the winter months.

EPA also requests the Respondents consider collecting indoor air samples at the time of the initial round of subslab sampling. The number and locations of the indoor air samples (if required) are shown on the VI Work Plan figures. Depending on the sample results, it is possible that collecting the indoor air samples during the initial subslab sampling could outweigh the costs of having to remobilize to collect the indoor air samples, as well as the laboratory costs for the follow-up round of subslab samples that must be collected concurrently with the indoor air samples. If the Respondents decide to collect the indoor air samples at the same time as the initial subslab sampling, then the sampling should be initiated as soon as possible after December 22, 2011, so that the winter season is characterized (e.g., in January, 2012).

As with the Operable Unit 1 Remedial Investigation/Feasibility Study Report, EPA is not interested in pursuing stipulated penalties from the Respondents over this matter. EPA's only interest is in having a final, approved VI Work Plan, so the Respondents and EPA can move forward with the VI Study at the Site.

If you would like to set up a conference call to discuss the modified VI Work Plan or this matter further, please feel free to contact me at 312-886-1843 or at cibulskis.karen@epa.gov. Legal questions may be directed to Mr. Thomas Nash, Assistant Regional Counsel, at 312-886-0522 or at nash.thomas@epa.gov.

Sincerely,



Karen Cibulskis
Remedial Project Manager
Cc: T. Prendiville, SR-6J (letter only)
T. Nash, C-14J (letter only)
L. Marshall, OEPA
K. Brown, ITW